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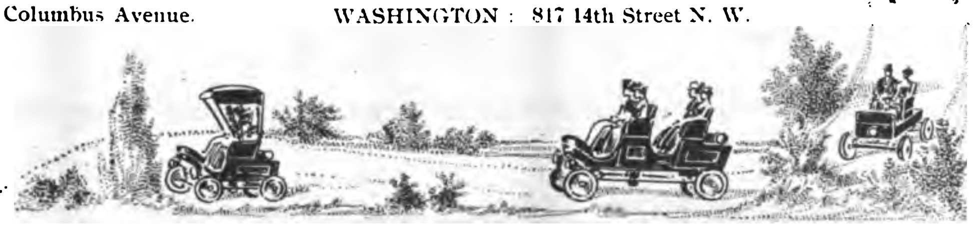

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American Ideas in Gasoline Vehicle Construction

Our English contemporaries have a habit of occasionally summing up and apportioning the credit for improvements in gasoline automobiles among their home manufacturers and those of France, thereby forgetting that there are other countries where successful efforts have been made toward the perfection of these machines. We have in mind particularly a recent article in which an attempt is made to show that some changes lately made by French manufacturers in the construction of gasoline engines are really old English ideas.

For instance, it is asserted that the recent adoption of sheet metal jackets for cylinders by a French firm was anticipated by an English firm, who for a number of years have made engines with aluminum cylinder jackets. There is certainly no very close relation between these two practices, the only points of similarity being that both are variations from common practice and both have for their object reduction in weight. It may be of interest to state in this connection that sheet metal jackets have been used by a prominent American manufacturer for over a year and that the first application of sheet metal jackets to automobile engines was certainly made in America.

Another claim made for the English manufacturers is that they, for the first time, showed that electric ignition was essentially practical on large cars. Benz and De Dion had found it applicable to voiturettes, but the Continental constructors "dared" to fit large machines with electric ignition only two years after the English manufacturers had shown the way.

Here it may become a question, What is a large car? and it may be denied that any large cars have been built in America. But aside from this, it is proper to say that we know of no American manufacturer or inventor of gasoline automobiles from 1886 up to the present who has used any other than electric ignition, vehicles of foreign origin being, of course, excepted. And while we do not wish to claim for American manufacturers the credit of having originated the generator system of ignition, we believe it can truthfully be said that they have been most persistent and successful in using and perfecting this system and that their ideas in this line are now adopted abroad.

Another practice which our contemporary believes to be of British origin is the use of roller bearings for direct loads and ball bearings where end thrusts have to be provided for. Both roller and ball bearings were employed in the earliest gasoline automobiles built here and on the main axle journals generally roller bearings, which supported on anti-friction surfaces both direct load and end thrust.

Another practice in gasoline carriage construction which may justly be considered of American origin, being almost universal here, while abroad it is still comparatively rare, particularly in large cars, is throttle control. Throttle control, allowing a gradual variation of speed from the maximum to very slow, high power per unit of weight, direct drive on the high gear and a minimum number of gears are some of the characteristics of the present average American gasoline carriage, features which no doubt will also be adopted in Europe at no distant date.

The Cleveland Club on Speeding.

It is nothing new for automobile clubs to ostensibly discourage reckless driving and threaten to discipline or actually to discipline members who are convicted of the offense. Somehow, however, the clubs have, as a rule, shown no eagerness to trace such offenses, being content to let the matter rest with the reading and publication of round, sonorous resolutions, which might temporarily allay the popular fears.

But the recent increase of automobile accidents and the rising public indignation at speed excesses, as well as the ordinances proposed in many cities to restrict the speed of automobiles, have impressed upon some of the clubs the necessity of dealing seriously with the speed question.

The Cleveland Automobile Club has

taken a foremost position in this respect and has announced its determination to act as auxiliary aid to the police in the apprehension of automobilists who may violate the new speed regulations in that city. They also offer to assist in the apprehension of their own members who may be caught violating the regulations.

The stand taken by the Cleveland Club is worthy of imitation. The object aimed at is to prevent users of automobiles generally from being brought into ill repute by the excesses of the scorchers. The club believes in a decent regard for the rights of other users of the road, and considers this the best guarantee of the rights of automobilists as defined in a recently passed liberal speed ordinance.

Cleveland is a strong centre of the automobile trade, and no doubt many members of the club are interested in the material welfare of the industry, which depends upon the continued growth of the use of automobiles. Such growth can only be insured by favorable speed legislation and by guarding the good name of automobilists as a class in the community.

The Economic Automobile.

The real mission of the motor vehicle is to lighten human labor by facilitating transportation in the field now occupied by the horse. Expensive, high speed, showy pleasure vehicles, which it has become the fashion to patronize, are of little aid toward the development of the industry along the lines that are to prove enduring and of general public benefit.

Much complaint is heard about high cost of operation, excessive repair bills, etc., but few ever stop to thoroughly investigate the facts regarding these costs. One reason why the cost of operation sometimes appears high to persons who may not have the least grounds for complaint is that they have been led to consider railway rates as a standard by which to judge the expense of automobile travel.

Now, whatever perfections may be made in automobiles, they will never reach a point where they can compete with railroads, nor with street cars in the city. The automobile being destined for an entirely different field, its expense of operation must be judged on an entirely different basis.

What is the cost of travel per mile to a physician in New York city keeping a horse and buggy? This question cannot be answered generally, because it depends, of course, largely on how many miles are accomplished per day with a horse and upon other varying factors. It is quite certain, however, that the cost per mile is always over 10 cents, and usually nearer 15 cents, a great difference compared to the 2 and 3 cents of railroad travel. Here is the standard for economy the automobile has to surpass in this particular field.

Fortunately this standard has already been exceeded in many cases with automobiles built to embody principles of economic operation. It is possible at present to operate an automobile at less than 10 cents a mile.

Of course, the average cost of operation is considerably above this, because the larger vehicles carrying four and more persons are necessarily more expensive to operate, consuming more fuel and requiring more expensive repairs; and also because not enough importance has been placed upon this point of economy of operation by the manufacturers.

Safety, comfort, speed, reliability—all these are required, but the automobile considered as a business vehicle would fail in spite of all of them if it did not show an economic advantage over the horse. Henceforth this factor of general economy will be considered of greater importance in judging the worth of particular makes of automobiles; not the fuel economy only, for the fuel cost represents rarely more than 10 per cent. of the cost of keeping and using an automobile. And speed and showiness and race record reputation will diminish in importance at the same time.

It would seem that for future contests the reliability and the general economy should be the two factors to be determined by the trials. Fuel economy is of chief interest from a technical standpoint only. What the prospective user cares to know more particularly is what the total cost of using an automobile will be. A 100-mile contest cannot shed any light on this subject, but a 500-mile or longer contest might furnish considerable data on this point. The cost of operation, of course, always depends on the personal factor, but a contest arranged to determine the cost of operation would show at least the possibilities in the line of economy.

The Effects of Motor Truck Wheels on Roads.

Extremely heavy vehicles with small wheels and narrow steel tires are injurious to str[illegible]nts, particularly to the better classes of pavement such as brick. The authorities of country towns after laying down such pavements are generally very careful to protect them from destruction by heavily loaded vehicles with narrow tires, and ordinances are generally passed requiring all vehicles running on such pavements to have wide tires.

In Newark, N. J., complaints have recently been made that a number of steam trucks in use there are doing much damage to a plank roadway over a bridge, and also injuring the brick pavements in the streets, and the city counsel has been asked to advise the Board of Works what can be done legally to regulate the use of steam wagons on the streets of the city.

The steam trucks here referred to weigh when loaded about 9 tons and have tires of 4½ inches and 5¼ inches width, front and rear respectively. No doubt such wagons will be rather destructive to certain forms of pavement, and the authorities may be justified in prohibiting their use on brick and asphalt. But the bridge roadways should certainly be kept in condition to withstand this form of traffic. Motor trucks may not require the use of boulevards and finely paved streets, but the bridges must certainly be kept open to them.

The high specific pressure at the road contact surface is as detrimental to the wheels or tires as it is to the pavement, but quite likely improvements will soon be made which will reduce this specific pressure. Wheels of larger diameter and greater width of tire are the most directly available means for lessening the specific contact pressure and its destructive effect on both pavement and tires and some form of semi-elastic tire, like wood tires, may be expected to reach a practical state at some time in the future, which will go far toward preventing road destruction by heavy motor trucks.

The Maddest Race of All.

The route Paris, Belfort, Bregenz, Vienna is strewn with wrecks, wrecks of racing automobiles on which manufacturers had staked their hopes of fame and fortune. Enormous efforts involving the outlay of a fair-sized manufacturing capital had been made by some firms to win the prize, and now the racing monsters, the objects of their hopes, lie shattered by the roadside or have been brought under cover to some repair shop along the way!

The automobile industry seems to be

regarded as a colossal gamble by the French manufacturers. Some of them invested a large part of their working capital in these racing monsters to either "lose or win." They seem to prefer to conduct their business on a system of "par tout ou rien," which they employ in controlling their motors.

One firm put in line a dozen machines reputed to be of 50 horse power each. Taking their cost of manufacture as $5,000 each, which certainly is not exaggerated, $60,000 at least was put into these machines directly. Adding to this the cost of shipping repair parts, gasoline and oil to various places along the route, that of shipping machines back and other incidental expenses, the race account of this firm cannot be much short of $100,000. Yet this firm, according to the reports to hand, did not win. Its machines are not even mentioned among the earlier arrivals in the last two stages.

The vehicles which were picked out as the winners beforehand did not make the records that had been expected. Although wonderfully fast, many of them went to pieces before reaching their goal.

The period, some time ago prophesied by a German engineer, when automobiles would be built to run just a certain distance or a certain time before going to pieces seems to have passed already—most of the competing vehicles in Paris-Vienna went to pieces before accomplishing the distance they were designed for.

At the banquet following the race the president of the Austrian Automobile Club is reported to have remarked that the race had demonstrated the usefulness of automobiles as a means of quick communication. This is nonsense. "Quick communication" on the public roads is ordinarily prohibited, and even if it were not anyone in Paris having pressing business in Vienna would take a sleeping car on the Continental express and arrive in Vienna about as early as with the fastest automobile. He would be a thousand times surer of safe and punctual arrival, the cost of the journey would be many times less and after arriving at his destination he would be fit to attend to his business instead of suffering from nervous prostration.

The whole affair was simply a mad orgy born of the craving for speed, excitement and danger. It is the hari-kari of the automobile industry. Not a word has so far been cabled to this country about the "tourists' excursion" connected with the race, this neglect of what might be considered the practical side of the event confirming still further the view that all practical ends were simply side issues in the wild debauch of speed.

Uniform Federal License Law

If, as seems assured, a number of the larger cities will require licenses from automobile drivers, means must be devised to meet the exigencies of touring. No doubt the license laws will mostly be so construed that a driver possessing a license issued by the authorities of one city will be allowed to operate his vehicle a certain time in another without making application for license. But this would not meet the case of operators from cities or towns in which no license is required.

A Federal license law covering the operation of automobiles would be most desirable. With a license issued by a bureau of the National Government a driver would be at liberty to operate an automobile anywhere in the United States and would be free from all annoyances from this source in touring. Moreover, a withdrawal of the license for any cause would deprive the individual of the right to operate automobiles anywhere in the country and would therefore be a more powerful deterrent against careless operation. Finally, political abuses would be much less probable in the case of a national license bureau than with municipal bureaus.

How to Operate a Gasoline Carriage.

By Albert L. Clough.

A great many people are about receiving or have just received gasoline automobiles who are unfamilar with their operation, and therefore, at the risk of repetition of much that has appeared in these columns, it may not be amiss to make some general remarks upon the handling of these machines.

It is a part of the sport of operating a motor vehicle to do so in the most effective manner, for thus come into play the "head qualities" which impart to all forms of sport the personal element, the cultivation and exercise of which add zest to the control of even purely insensate and mechanical creations. The man who drives a spirited pair gains his enjoyment partly from his sense of control over them, and partly from his exercise of skill in getting the work out of them most effectively and with the least wear and tear on the animals themselves. The man who sails a yacht enjoys the exercise of his skill in so handling matters as to take advantage of every condition of wind and sea, and thus covers the course with the utmost speed consistent with comfort and safety. In an exactly similar way the true automobilist gains as legitimate and genuine a satisfaction in so taking advantage of every peculiarity of the mechanism under his control and of every diversity of road surface and grade as to feel that the forces at his command are most efficiently applied with due regard to the endurance of the mechanism which is faithful to the motion of his hand, even to the point of its own destruction. This is the main pleasure of running an automobile, aside from the change of scene enjoyed and the very elemental pleasure of motion.

THE PERSONAL EQUATION.

Two men may take the same machine over the same course, in the same time, with all conditions identical, and one may use 50 per cent. more gasoline than the other and at the same time boil the cooling water. The man who covers the course with a low gasoline consumption and without overheating his motor will have the truer sport.

THE FIRST RULE.

There are a few points which, while perfectly obvious to the practiced chauffeur, are not necessarily self-evident. Perhaps the most important of all rules in the operation of gasoline machines is this: Never allow your engine to run at a higher speed than necessary to do the desired work. This is the rule that if carried out conscientiously results in the saving of fuel, water and the reduction of wear and tear to a minimum. The rule explicitly covers the handling of the engine controlling devices, and implicitly the handling of the gear changes. Most American machines make use of a pedal controlling the position of the engine throttle, and this button or pedal is automatically restored to the position corresponding to a nearly closed throttle by the action of a spring. The adjustments should be so made that when the foot is removed from the pedal and the spring has acted the engine will have just sufficient gas to prevent it from slowing down and stopping. It should have just enough power to overcome its own losses and thus keep turning over quietly at a very low speed. It is most important that the act of removing the foot from the pedal should become purely involuntary upon the occurrence of any emergency and whenever a clutch is thrown out. In this way the power of the engine is unconsciously reduced to a minimum and the carriage slowed down when any emergency on the road is at hand, and also the engine is prevented from racing by always being throttled down, without conscious effort, when the clutch is disengaged. It seems very doubtful if any better arrangement could be devised than the foot operated throttle, which is automatically closed to the position of minimum speed by a spring. In the use of the throttle it could be opened only just wide enough to give the gas necessary to do the work, and it is remarkable how much flexibility may be demonstrated to exist

in a gasoline machine by careful use of the throttle, if coupled with correct spark position.

CONTROL OF THE SPARK.

In the control of the spark lies the opportunity for the exercise of much judgment, and there are very few who can regulate the ignition properly to secure the best economy by hand. An automatic device is very likely to become generally adopted in the near future to perform this function. Passable results can be obtained in ordinary practice by advancing the spark for a given throttle position as long as an increase of speed is obtained thereby, and nearly up to the point where the engine begins to show the results of an early spark in the sound or the "feel" of its operation. The sound of the exhaust is some indication of the correctness of the spark position, a very loud and prolonged exhaust being indicative of a late spark and a very light exhaust, coupled with a tendency to "pound," being a symptom of early ignition.

It should be obvious to every operator that when the engine slows down under hard work on a hill, the ignition should be set at a later point than when the carriage is speeding freely on the level. It is hoped that before very long the necessity of regulating the sparks by adjustment may be obviated and this source of care and attention be removed from the shoulders of the operator.

GEAR CHANGING.

In the use of the gear changes the ordinarily accepted rule is to run as much as possible on the highest gear, in order that the engine and the gear train may make as few turns as possible in a given distance traversed, and thus a saving be effected in fuel, battery power, water and wear and tear. Just here should be mentioned what is probably the most important consideration in the running of a gasoline motor carriage—the taking advantage as fully as possible of the momentum of the vehicle. The rule might perhaps read: Never let your engine lose its speed when hard work is to be required of it, for if a gas engine is allowed to slow down too much when hard work is immediately ahead of it, it will "pick up" with the utmost difficulty, if at all. A great many short though quite steep hills may be taken on the highest gear, if they are "charged" vigorously by running with full power over the level space at the bottom and thereby obtaining a powerful momentum. If the hill be so long or so steep that it cannot be taken on the high gear, a strong attack upon the grade with full power on may carry the vehicle well up toward the summit and require the use of a lower gear for only a short distance. One should stick to the highest gear until the engine slows well down and shows signs of commencing to "labor" and then the change should be made to the next lower gear as nearly instantaneously as possible, so as to lose as little of the momentum of the vehicle as may be. With carriages using the separate clutch method of gear changing, the shifting from one gear to another is a matter of a single instant only, but with vehicles using a sliding pinion system three operations are necessary to effect the change of gear and a little more time is lost, but it may be made very slight by practice. In throwing in the clutch after changing the gear, it is well to have the engine speeded to a point nearly corresponding with the rate of motion of the carriage so that the clutch will go in with little slip and small consequent wear.

One often sees operators change from a high gear to a low gear without speeding the engine up, the result being that when the clutch is thrown in the motion of the vehicle is arrested with a severe and sudden jerk, which is hard for the mechanism of the machine and distressing to the passengers. Of course, if the engine begins to slow down unduly upon the second speed it will be necessary to resort to the third or lowest speed. What has been said in regard to the use of gears refers only to their use when the maximum of economy in fuel, water and battery is sought after. If the greatest speed over a given course is the desideratum, the high gear should be relinquished when the engine has slowed down to such a point that the carriage is traveling at a speed no higher than it would run on the next lower speed, with the engine operating at full power. If one is trying to cover a hilly course in the minimum time there is opportunity for the display of considerable judgment in the throwing in of the different gears at the most advantageous moments. Everyone hopes that the time will come when there will be no changes of gear necessary in the use of a gasoline vehicle, owing to the greatly improved flexibility of the engine and greatly increased "ability" of the vehicle which the future may afford. The views of C. C. Bramwell upon the possibility of realizing this almost ideal condition of "gearlessness" are worthy of the deepest interest, and everyone hopes that he can solve the problem. It is safe to say that, in the words of the late Captain Cuttle, "He can if any man can. If any man can, he can."

IN DRIVING DOWN HILL

there is opportunity for good judgment. One should try both brakes very frequently in the course of a run to demonstrate that they are in working order. Neither should one forget that there is a third natural brake on every gasoline carriage, namely, the engine. One can always reduce the speed of the vehicle to a low point by putting in the lowest gear and cutting off the gas from the engine by removing the foot from the throttle. The carriage will then hardly exceed a few miles an hour in speed under any conditions. If then the ignition current is cut off by means of a switch, the engine will act most powerfully as a brake and will take one safely down severe grades. If one comes to the crest of a long hill, down which an exhilarating coast is expected, it is a good opportunity to give the faithful motor a rest, and one may throw out the clutch, cut off the igniting current and allow the motor to stop. This will save fuel and give the cool breezes an opportunity to play through the radiators and perhaps keep the water from boiling. When the bottom of the hill is near at hand the current should be switched on and the high speed clutch should be gradually applied, thus starting the motor. The only objection to this practice is that it is somewhat wearing on clutches, but if the lubrication is good this need not be serious.

A HANDY LITTLE WRINKLE

to remember is that one can start a gasoline carriage without cranking the motor, if the vehicle has been left standing upon a hill of sufficient grade so that the carriage will start of its own accord when the brake is released. All one has to do is to turn on the gasoline, switch on the spark, release the brake and after the carriage has gained some headway throw in the high speed clutch. The writer finds that this little trick impresses the "dear public" sometimes and saves muscular labor. It is possible to install a little push button switch in the footboard of the carriage, the first pressure of which will shut off the spark and the next pressure will throw it on again, and this may be used very conveniently to control the ignition of the motor, more so than the ordinary snap switch. With one foot on this button and the other on the throttle pedal, fine control of the engine may be had. The ignition current may be cut off just before a bad crossing is reached and the carriage thus slowed down, and as soon as the crossing is passed another pressure on the button switch will start the engine again into regular operation. In case of frightened horses, when it becomes necessary to shut down the engine as well as to stop the carriage, this may be done instantly by the foot button switch and save the delay caused by fumbling for the igniter switch, which is usually placed out of convenient reach.

FOOT CONTROL OF ENGINE.

Judging from personal experience, it would seem that it is advantageous to have the control of the engine assumed by the feet, which, after a certain amount of practice, become very faithful automatics in the performance of the right action at the right time. It is also believed that both hands should generally be available for steering, as this is essentially the most important function to be performed. There is one point that cannot be dwelt upon too insistently, and that is that no one is fitted to operate a motor carriage under all kinds of conditions to whom its control has not become

A PURELY REFLEX ACT.

Every action connected with the control of a motor vehicle should be capable of be-

ing carried out without the intervention of the higher or reasoning faculties of the brain. Under any given emergency the response of the nerves and muscles which are to perform the act that is called for must be as certain and inevitable as the act of winking when a motion is made before the face. An ~~operator who thoroughly un-~~ derstands ~~his carriage in theory and prac-~~ tice and who is conversant with the mode of operation of a ~~gasoline engine, if he has~~ ~~naturally a cool head and~~ enough of the sporting instinct to make him take pride in the results achieved, will, when he has had an adequate amount of practice, be ~~likely to~~ become a good and safe operator.

Commercial Possibilities of the Electric Industrial Wagon.

By Frederick J. Newman.

If anyone should ask the layman wherein the great future for automobiles lies he would undoubtedly receive the answer, in the vast majority of cases, "In the line of industrial wagons," meaning trucks, delivery wagons, 'buses, cabs, and, in fact, all cases where motor vehicles are used for purposes other than for pleasure. It would be well before entering into details in regard to apparatus to answer this question: Has the horse suddenly become objectionable and ceased to serve its usefulness, or have we progressed so far that as humanitarians we pity our old faithful friend?

The fundamental value of any proposition is its commercial aspect, and in connection with the automobile it is the conditions the market presents for its manufacture. The passing of the horse has not been brought about suddenly with the introduction of the automobile, but began when mechanics were first introduced into commercial and industrial life. The steam locomotive serves its purpose, and the horse has passed for this service; the electric trolley serves its, and the horse has been abandoned, and both of these have brought about such an immense improvement in their respective fields over former modes of transportation that we are looking for the automobile to bring about the same improvements in industrial vehicles during our lifetime. I say industrial, for there are too many lovers of the horse to bring about almost a complete change in pleasure vehicles in this generation, and I say this in spite of the fact that I and most of my friends find more pleasure in driving a motor than a horse.

With this in view, and to no small extent as an advertisement, business houses have been induced to purchase delivery wagons which, although in many cases they have been a failure, have demonstrated to automobile engineers that there is enough good in them to warrant a greater expenditure of time and money to bring about their perfection. In the vast majority of cases the vehicles first used for delivery, 'bus and cab service in America were electrics. The electric vehicles appeared ideal; the motors and transmission were efficient, they were flexible, the combination simple and the vehicles easily controlled. There is less apparent danger, no heat, odor nor vibration, and with all these possibilities and the apparent advantages over steam and gasoline, it is no wonder that we find that the vast majority of pioneers in this line were electrics.

In regard to the general equipments—they were modeled after street railway practice. The motors were hung on the axles and reaches, some springs suspended on one end, others rigid. The control was also modeled after this precedent, comprising series-parallel connection of batteries, of motors or both. Storage batteries were heavy, and as soon as there was a large demand for a lighter battery manufacturers began to make thinner electrodes in order to get more surface, and in that way more capacity for a given weight. What did all this result in ?

The problems to solve in regard to service conditions in an automobile, while similar to those of railway engineering, present traction in its worst phase. Railway cars have tracks to run on, which reduce shocks and the consequent wear and tear to a minimum, while with motor vehicles our best granite block pavements brought about an enormous depreciation of the apparatus. Many have learned, as has the writer, by having experience bumped into them, that to hang motors on the axles, or any place below the vehicle springs, was a fatal mistake. Motors had a very rapid rate of depreciation, gears were thrown out of mesh very easily, and necessitated the introduction of a more expensive element—rubber tires to absorb shocks. Of course, traction and slippage enter here, many will say, but this part of the problem could have been solved in a cheaper manner.

I remember a few years ago the editor of The Horseless Age remarked in the paper, in connection with "Lead Cab Failure," that he could not see why electric motors were not hung on the body, and chain transmission used, the same as in foreign and gasoline practice. It was not long before some pleasure vehicle manufacturers took up the suggestion and built vehicles accordingly. Last fall several business vehicles were built with electric motors hung on the body, chain transmission and flat long distance bearings throughout. One of these wagons is being used on hilly and bad roads in Pittsburg, and it is giving entire satisfaction. Other than oiling weekly and keeping the commutator clean the motors and transmission need no attention, and give promise of a lower rate of depreciation than any other automobile I know of, in spite of the fact that this vehicle has iron tires. This is enough to show that as far as motor suspension and transmission are concerned, body or chassis hanging is the best modern practice, and if adhered to we may consider that in this respect the business vehicle is almost perfect.

The arrangement of the controller is in most cases a matter of individual choice. Many vehicles are built which vary their speed by means of grouping of the batteries only, but where they must be occasionally and quickly handled, it seems best to group all the batteries in series and depend upon series-parallel connection of the motors and also field commutation. The vehicle above mentioned has four speeds in each direction obtained by the latter method.

So much has been said and written about tires that it is hard to say anything new, but a few words from actual experience are always interesting. No doubt the vast majority of expenditures for rapid depreciation have been caused by rubber tires. It is not necessary to give figures here, for they are too well known, or mention the vast outlay necessary for large rubber tires deemed necessary by many for heavy vehicles. An iron tire, the most durable and a development of many years of experience in vehicle building, should by all means be used where possible, and if we hang our motors so that they get the benefit of the springs of the vehicle we can use iron tires in most cases. Of course, many will contend that the slippage of the wheels on account of the iron tires is troublesome, but this can be overcome by using a rough tire in winter and sand when troubled in other seasons. Of course, there are cases when these methods will be of no avail, but rubber tires have the same fault under these same conditions.

Late in the year 1900 the writer was acting as consulting engineer for a concern which was building a 10-ton vehicle. The question of tires was a great source of worry, especially since cab tire failures stared him in the face. It was suggested by him to use a tire which had wood blocks arranged with the end grained to the road and held in by means of an iron wedge channel tire. This was, however, not adopted, for it was looked at as an experiment, and finally $500 worth of rubber was bought. Probably rubber was best for this service, since the motors depended entirely upon the tires to deaden the shocks. This same design was afterward gotten up by the writer, and was applied to a wagon built by Studebaker Brothers, equipped with Westinghouse motors, and gives promise of success. While it is not as resilient as rubber, it is very cheap, the cost being almost nothing in comparison, and it serves its purpose. It gives a "lead pipe effect," deadens the rattle and noise due to rough pavements and makes an easier riding vehicle. As yet it is almost too early to judge of its success, but it promises well and users speak highly of it. If others would try it a combination of ideas from experiment may result in great improvements in this line.

In regard to batteries much can be said. The battery, in spite of all its faults, has

been the subject of much more abuse than it deserves, especially among those using them, and they help materially to injure the rapid introduction of the electric vehicle. When batteries were first used for traction purposes they weighed two or three times what they weigh to-day for the same capacity and life. While the construction of the lighter cells of to-day is not much more substantial than was that of the heavier types of a few years ago, still for equal weights the discharge rate per pound of cell was double that of to-day and the mileage less than half, so that the rapid discharge and short range of action necessitating more frequent charges brought about a very rapid depreciation and immense total cost per mile. The Exide battery gives 4.5 ampere hours per pound at one and one-tenth (1.1) ampere hours per pound rate, and when handled intelligently gives a life of over 7,000 miles in commercial service and from 40 to 50 miles per charge, depending upon the weight of battery used. Where more weight of battery is used the life is greater, on account of the easier service to which the battery is subjected, but above certain limitations the resultant economy is not great and is often questionable.

Separators are now used which are more effective in preventing short circuit, thereby allowing the battery to hold its charge. Among other batteries doing good service can be mentioned the Porter, the Gould and the National. If the Edison battery will be all that it is claimed to be, even though it should have no more capacity than those above mentioned, we may expect a greater future for electric vehicles. In a letter the writer received from the Edison laboratory it is stated that there would be an almost indefinite life, and besides charging the only attention necessary would be to add water occasionally. This is what we are looking for. Although the mileage obtainable per charge from the present batteries is sufficient for express and delivery service, the future of electric business conveyances would be much enhanced if the battery had no greater rate of depreciation than motors on the Fifth avenue 'buses in New York.

As far as a recital of costs for electric delivery service is concerned, it is well for one interested to read the article by E. E. Fliess in THE HORSELESS AGE of February 6, 1901. It is well known that to charge storage batteries is a more expensive operation than to keep tanks full of water and gasoline, and renew ignition plugs, etc., but when we consider a comparison outside of pleasure vehicles the economy of gasoline and steam for express service is not so great. This is due to the wholesale character of the work, for when large numbers of vehicles are operated from the same point, as would be the case in express service, power would be used in large enough quantities to warrant the installation of a generating plant. The resultant efficiency would be comparatively high, since the efficiency of the generating plant is much higher than automobile engines will ever be, and the electric vehicle to-day also employs the most efficient apparatus.

When electric railways were first introduced many doubted the immense future predicted for them. They presented ideals but needed perfection, and when they had gone through the stage of development manufacturers and users alike realized that standardization of apparatus was necessary. When the ideal automobile is here it will also be necessary to adopt a standard apparatus, and in this way will be brought about a systematic manufacture and a consequent lessening in cost of production. The electric vehicle people are beginning to realize this as far as motors are concerned, for such manufacturers as the Westinghouse Electric and the Elwell-Parker companies are manufacturing motors with almost universal application, showing a preference for body hanging. Controllers are also furnished which can be easily applied under the seat of the vehicle, with left-hand control and foot reverse. Batteries are also beginning to be standardized, and the different battery manufacturers are conforming very nearly to like dimensions for like capacities.

Brake Test Demonstrations in Philadelphia

The recent unfavorable attitude of the Philadelphia city council, and proposals to limit the speed of automobiles in the business district of that city to 5 miles an hour, led the Philadelphia Automobile Club to organize a series of braking demonstrations before members of the city government and the public, similar to those recently held in New York city. The tests were made on George's Hill, Fairmount Park, on the afternoon of June 24. Vehicles of all three motive powers participated and both manufacturers' and privately owned vehicles. For purposes of comparison tests were also made with a double-horse team and a four-in-hand turnout, and lastly a bicycle policeman was required to make a demonstration of his stopping powers.

For the tests a stretch of 1-10th of a mile from a point above the concourse to the foot of the hill, midway to Belmont avenue, was laid out. From this stretch a body of park guards carefully kept all wayfarers. The test was made under the auspices of the Automobile Club of Philadelphia and the Automobile Club of America. Winthrop E. Scarritt, president of the Automobile Club of America, acted as referee; Captain Opdyke had general supervision of the course and the events and F. C. Lewin was registrar.

The members of the council and other prominent spectators were conveyed to the scene of the events in about forty automobiles of all descriptions, from the light electric runabout to a ponderous gasoline wagon, on which seventeen passengers were seated. The start was made from the City Hall at 3:20 o'clock, going up Broad street to Girard avenue, and out the latter thoroughfare to West Park. The pacemaker was E. B. Gallaher, in his Mors gasoline touring car, with Director English, President McCurdy and Councilman Edwards as passengers.

After some preliminary exhibitions ex-Governor William Bunn went over the measured off course with his horse team. He covered the distance in 17 1-5 seconds, corresponding to a speed of 21.5 miles per hour, and pulled up in a distance of 61 feet. Next Edward Browning went over the course twice with his tally-ho, the first time doing the distance in 18 seconds and stopping in 82 feet 4 inches and the second time doing the distance in 21 seconds and stopping in 62 feet 8 inches.

A park guard mounted on a bicycle was passing. He was asked to cover the course. He did it in 12 2-15 seconds and stopped in 185 feet, using no brake and back pedaling only.

Then followed the tests with the automobiles. The results were very satisfactory and the braking power shown was on an average even better than in the New York tests. At the suggestion of Thomas S. Wiltbank, chairman of the council's law committee, E. B. Gallaher made a number of successive trials with the same machine with increasing speeds. All results are given in the annexed table.

In the various trials, ranging in speed from 8½ miles to 30 miles an hour no accident occurred. The nearest approach to an accident was at the finish of the fifth event. Percy Neil, who drove the Oldsmobile, was unable to make the brake work properly as he crossed the tape, and his machine swerved to the right toward a crowd of spectators, but no one was injured.

Although the councilmen had been riding alternately in the various cars, they refused to be satisfied with the tests. Their contention was that the vehicles shown were all driven by experts, and that it was more a question of skill than anything else. Thereupon Arthur Bloch and Livingston Biddle volunteered to undergo the ordeal. Mr. Bloch is said to have purchased his machine only three weeks ago, while Mr. Biddle guided his automobile for the first time ten days ago. The former stopped within 30 feet 4 inches after going at 14½ miles an hour, while Biddle pulled up within 50 feet 10 inches after swinging down the course at 24 miles an hour.

After these demonstrations a banquet was spread at Belmont Mansion. Chairman Wiltbank, of the law committee, presided. He introduced President Scarritt who, after picturing the obstacles which all pioneers had to overcome, said:

"To limit the automobiles to 5 miles per hour is too severe. A man can walk 6 miles an hour. In New York the

WAITING TO TAKE THE CITY OFFICIALS TO THE BRAKE TEST.

hearses go faster than 5 miles an hour. Yet I want to say that the best interests of automobiling demand that there be restrictions.

"The ordinances before the councils limiting the speed to 8 miles between Vine and South streets and Sixteenth street and the Delaware, to 10 miles between Jackson street and Erie avenue and Fifty-second street and the Delaware and to 20 miles in the remainder of the city, seems to me to be fair to all concerned. But after all the personal equation is the most important. No matter how great or how low the speed, safety lies in having only competent men in charge of automobiles.

"Philadelphia with her fine pavements should give particular attention to the matter of an automobile ordinance."

President McCurdy expressed his approval of the proposed ordinance and suggested that there should be established a licensing bureau for automobiles, to be presided over by an expert. Barclay Warburton stated that Director English had informed him that he favored such an arrangement. Licenses would be issued only to those competent to handle automobiles safely. In case of violations no arrests would be made, but the number of the licensee would be reported to the department and the violator then summoned to appear, and penalties should be $10 for the first offense and the same amount for successive offenses, with thirty days' suspension of license for the second offense, sixty days for the third and indefinite or possible entire revocation for the fourth offense.

RESULTS OF BRAKE TRIALS.

Vehicle.	Weight.	Miles per Hour.	Stopped in.	
			Ft.	In.
Locomobile surrey, steam	1,200	27½	71	
Columbia electric phaeton	2,700	17¼	40	6
Oldsmobile runabout, gasoline	950	21	33	
Autocar tonneau, gasoline	1,400	19½	59	8
Autocar tonneau, gasoline	1,400	21½	62	8
Winton touring car, gasoline	2,000	23½	56	5
Mercedes tonneau, gasoline	2,300	25½	68	2
Packard touring car, gasoline	2,100	19¾	42	8
Columbia electric runabout	2,700	12	12	7
Panhard touring car, gasoline	3,000	27¾	74	
Mors touring car, gasoline	2,200	8	7	3
Mors touring car, gasoline	2,200	13	10	1
Mors touring car, gasoline	2,200	17½	22	
Mors touring car, gasoline	2,200	18½	25	2
Mors touring car, gasoline	2,200	21½	40	
Mors touring car, gasoline	2,200	30	91	3
PRIVATE OWNERS.				
Electric runabout	1,900	14½	30	4
Autocar	1,400	24	50	10
HORSE VEHICLES.				
Double team	....	21½	61	
Four-in-hand	....	17¼	62	8

THE PHILADELPHIA SPEED ORDINANCE.

The law committee of the Philadelphia Council on June 25 recommended an ordinance regulating the speed of automobiles, presented by George McCurdy, as an amendment of the ordinance introduced by Edward W. Patton the week before.

The measure presented by Mr. McCurdy originally recommended speeds of 8, 12 and 20 miles, which, after a spirited discussion, were finally changed to 7, 10 and 15 miles an hour. Here are some extracts from the ordinance as recommended:

Before any vehicle of the classes described shall be allowed to be run upon the public streets of the city a certificate shall have first been procured from the Department of Public Safety, Bureau of Boiler Inspection, which is hereby authorized and directed to issue such certificate upon an application in writing made by the manufacturer or owner thereof to the bureau on a properly printed form to be provided by the bureau, such certification to be based upon the following regulations regarding safety: The reservoirs, tubes and whatever parts employed for the holding of explosive or inflammable products shall be so constructed as not to allow the escape or falling out of any material which could cause an explosion or a fire. The steering gear shall be so grouped that the driver can manipulate the same while watching his route. There shall be nothing in front of the driver to obscure his view, and the indicating apparatus which he has to consult should be placed where he can easily see it. The vehicle shall be so arranged as to respond readily to the steering gear and to take sharp curves easily. Every part of the steering gear should be solidly and safely constructed. Automobiles whose dead weight exceeds 500 pounds shall be furnished with machinery for backward mo-

MEASURING THE STOP.

tion. Every automobile shall be provided with a good and sufficient brake, which shall make it possible to check any forward or backward motion, and a suitable audible signal, which shall be rung or blown by the operator only to warn other vehicles and travelers upon the highways of his approach or whenever there is danger of collision or accident. They shall also be provided with appliances to prevent the unnecessary escape of steam or vapor, and improved mufflers, etc., to stop any unnecessary noise in the operation or management of said vehicle upon the highway.

This certificate that automobiles satisfy the conditions before mentioned shall be granted by the Department of Public Safety, Bureau of Boiler Inspection, at the request of the manufacturer or the owner. In the case of machines made in Philadelphia, the manufacturer shall be compelled to submit to inspection every type of automobile which he has constructed. In the case of machines manufactured outside of Philadelphia the examination must be made before they can be used in Philadelphia, at such place as may be designated by the Department of Public Safety, Bureau of Boiler Inspection. When the official delegated for this work has ascertained that the machine in question satisfies all the foregoing regulations, he will draw up his report, which will be sworn to before a magistrate or notary public, and which will be forwarded to the manufacturer or the owner. The manufacturer shall have the power to deliver to the public any number of carriages constructed, after the types which have been certified to meet all requirements. He will give every one of them its proper number in the series to which it belongs, and will remit to the buyer a copy of the sworn certificate that the vehicle sold conforms to the municipal regulations. Each machine shall be clearly marked with the name of the manufacturer, the indication of the type and the order number in the series of that type and the certificate number. Owners of vehicles shall not permit an unlicensed person to operate such vehicle upon the streets of the city and shall comply in every particular with all the terms contained in this ordinance. The fee for certification to be paid by the applicant to the Bureau of Boiler Inspection shall be $2. In case of refusal by the Boiler Inspection Bureau to grant a sworn certificate stating the vehicle presented is in accordance with the above regulations, the applicant is at liberty to appeal to the Director of the Department of Public Safety.

No person shall drive an automobile without first obtaining a license, granted by the Department of Public Safety. The fee for such license to be paid by the applicant to said department shall be $2 for the first year and $1 for every year thereafter, which shall include the cost of a sign bearing the number of the said license. It shall be the duty of any applicant for such license to furnish the bureau with satisfactory evidence of his competency, his name and residence, and it shall be the duty of the bureau to keep a record of the same and the number of the license issued to each person. If any owner of a license shall change his address he shall forthwith notify in writing the bureau of his new address, otherwise his license shall be revoked.

No operator in charge of an automobile shall drive within that part of the city of Philadelphia bounded by Vine street, South street, Sixteenth street, and the Delaware River, at a rate of speed greater than 7 miles per hour, and within all other parts of the city of Philadelphia at a rate of speed greater than 10 miles per hour, excepting north of Erie avenue, south of Porter street, and west of Fifty-second street, where a maximum speed of not more than 15 miles an hour will be permitted. Automobiles shall always exhibit while in use, from one hour after sunset to one hour before sunrise, two lamps showing white lights visible within a reasonable distance in the direction toward which the vehicle is proceeding, and at least one lamp showing a red light to the rear, said lamps to be placed so as to be free from obstruction to light from other parts of said vehicle, and shall always display in a prominent part of said vehicle, to be determined by the Bureau of Boiler Inspection, a sign 7 inches long and 4 inches wide, bearing the license number of its driver.

The driver of an automobile, if requested by the occupant of any vehicle propelled by animal power, shall stop said automobile until the other vehicle has passed, and shall be governed by the commonly accepted rules of the road, turning to the right hand side in meeting vehicles and teams and persons headed in the direction opposite to that in which he is moving, and by turning to the left hand side in passing vehicles headed in the same direction in which he is moving.

An automobile passing a vehicle any other than an automobile, the speed shall be reduced to 10 miles an hour. An auto-

mobile approaching a vehicle any other than an automobile shall pass it at the rate not exceeding 10 miles an hour. Any driver of an automobile shall bring the same to a dead stop, if said automobile is causing horses to take fright.

The driver shall never leave the vehicle without first having taken necessary precautions for preventing any accident and for subduing the noise of the motor, and anyone tampering with an automobile in the absence of its occupants while upon the highway shall be immediately arrested for breach of the peace and disorderly conduct. In case of failure on the part of the manufacturer or owner to fulfill all of the requirements set forth in the application upon which such certificate was issued, the manufacturer or owner of such vehicle shall be subject to a fine of $50 for the first offense and $75 for each succeeding offense. In case of the violation of any of the provisions of this ordinance by any person operating any vehicle a fine of $10 shall be imposed. And the Director of the Department of Public Safety is hereby authorized, in his discretion, in case of a second violation of any of the provisions of this ordinance, in additon to said fine, to suspend said license for a period not longer than thirty days; and for the third offense, in addition to said fine, to suspend said license for a period not exceeding three months, and for any succeeding violation, in addition to said fine, he may, in his discretion, suspend said license for an indefinite period or revoke the same. The clause relating to issuing of licenses shall not apply to drivers of automobiles from other cities while passing through Philadelphia, excepting in that said drivers should remain within the city limits longer than forty-eight hours. Then they shall be required to apply for a license as hereinbefore provided.

The "Citadine."

By Jules Junker.

The past winter proved so severe that our delivery wagons were altogether stopped. The high winds and deep frozen snow retarded the wagons so much that it was impossible to reach our customers in good time. Moreover, the men complained bitterly of the cold. They were frozen almost stiff. To keep up at all they were obliged to have recourse to stimulants (whiskey), and put themselves thereby out of condition to be entrusted with a motor wagon. It was a hard blow, but we had to bear it.

When springtime came, however, we began once more to ride about in a pleasure phaeton. One day on returning from a ride to Paoli, on the famous Lancaster pike, we were pursued by a constable on a bicycle at Wayne and compelled to accompany him to the squire's office, where he charged us with violating a recent ordinance of the township. The whole country thereabouts had been, for some time past, terrorized by a Panhard tonneau of high power and speed owned by a wealthy resident of Bryn Mawr and conducted usually by a chauffeur, popularly known as "Frenchy." This ordinance was enacted, imposing progressively heavy fines for repeated offenses as to excessive speed. Ten miles an hour is the limit. The squire spoke of his own family, who used a horse and carriage to ride about the country, and now were so nervous with fear and anxiety about the possibility of meeting "Frenchy" on the road that they had lost all pleasure or even desire to ride. We were not fined, but required to pay the costs—$2.50.

Altogether, it was a most unpleasant experience. These facts led me to the idea of a vehicle to carry a large family at a speed so low that it would be impossible to violate these various enactments which are springing up against the automobile wherever the roads are good enough to invite them to circulate. I cut down the body of a German Daimler delivery wagon manufactured in Cannstadt by the Daimler Motoren Gesellschaft and put two doors on the sides, seats inside and lazy backs all around. It is nicely upholstered and painted red, with black stripes. Its motor has but 4 horse power, being of two cylinders, with hot tube ignition.

I furnished the wheels with new solid rubber tires, and about ten days ago the carriage builder delivered it to us. The cost of alteration was $232.50 for the carriage work and $124 for the new tires. We loaded it with ten adult persons and began with much timidity and anxiety to run it about the streets at first, then into Fairmount Park, along the river road, which is free from hills.

The wagon did so well that we were greatly encouraged, and finally ventured to try it in New Jersey on the road to Atlantic City. We rode about 22 miles down to Waterford and return in one afternoon. We had a good chance to time its speed, because the sign posts are marked with the exact number of miles from one to another. The wagon, which we have named "Citadine," went along beautifully 12 miles an hour, up and down hill. The hills are mere gentle swells of the ground. The road is excellent. We frightened but few horses, although the Jersey horses are miserably trained and do just about as they please.

We have no bell nor horn on the "Citadine." The theory is that both are offensive to those who have horses, as they are used so indiscreetly by the chauffeur that they seem to demand a kind of "right of way," which the country folks resent very much. Indeed, they scowl and swear sometimes so much that you realize how odious the automobile has become to the quiet country people, who like to sit in their carriages, half asleep, and let the horse have his own way generally.

The "Citadine" is very comfortable and roomy. As to its appearance, "handsome is that handsome does."

NEW VEHICLES AND PARTS.

The New "Long Distance" Touring Carriage.

The United States Long Distance Automobile Company, Jersey City, N. J., is now producing vehicles of the type shown in the illustration, in lots. This machine may be considered the successor of their runabout, the manufacture of which has been discontinued. The new carriage has a longer wheel base than the old type, one more forward speed and numerous other improvements.

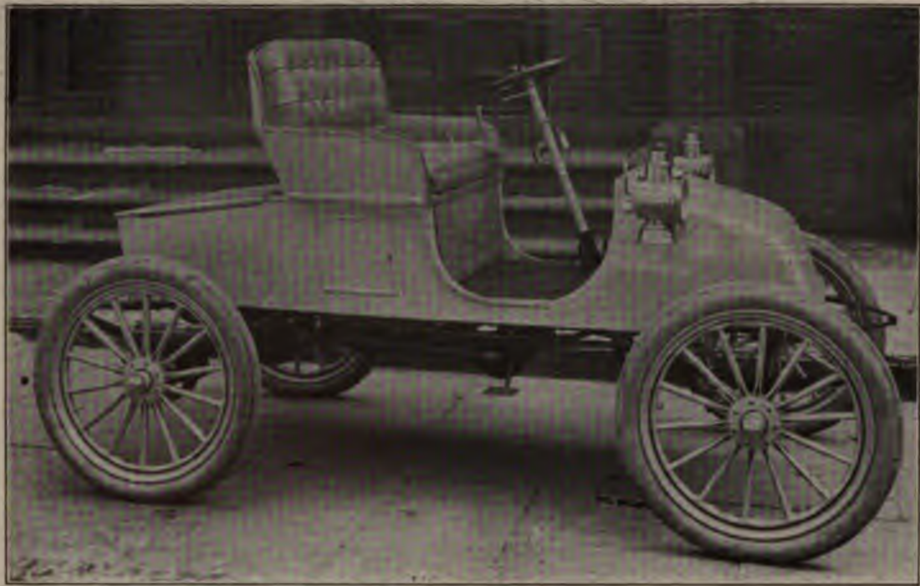
Like the runabout, this vehicle is propelled by a single cylinder, horizontal gasoline engine, the bore and stroke of which are 5 and 7 inches respectively. When running at a normal speed the motor makes 700 revolutions per minute and is said to develop 7 horse power. This speed can, of course, be increased quite a little or decreased as well at will.

The wheel base is 6 feet 4 inches and the tread is standard. The wheels have 14 wooden spokes and are all shod with 30x3½ inch Goodrich clincher tires. The rear axle is live and driven by a chain. All wheel bearings are plain and bushed. The running gear is reachless. In front the body is supported by two three-quarter elliptic springs and in the rear by semi-elliptics. The latter are unusually long and all of them are exceptionally wide. The frame is built up of angle iron and is hidden from view by the body.

Three speed changes forward and a reverse are used. On the "high gear" the drive is direct, the planetary system of gearing being employed. A heavy Whitney roller chain effects the transmission of power from the change-speed shaft to the rear axle.

In the former engine the exhaust valve was located horizontally. This feature has been eliminated in the design of the new model, in which both the exhaust and admission valves are operated by a single cam on a horizontal cam shaft. The valve stems have a slight inclination to the vertical and are much shorter than the stem of the former exhaust valve. As a result their springs have but little inertia to overcome and are comparatively light. The exhaust valve, to which the above particularly applies, closes down with a minimum of noise.

Make and break ignition has been retained, but the method of operating the movable contact had to be changed on account of the entirely new system of valve gear. The latter strongly resembles that of the Otto gas engine of to-day. A helical gear on the crank shaft drives the valve gear shaft at right angles to it by means of a gear that meshes with it. The cam that actuates the port valves is keyed to this shaft at the other end, adjoining the cylinder head. Parallel with the cam shaft is another shaft, which is driven at the



New Model "Long Distance" Touring Car.

same speed by it and by means of helical gears. This shaft actuates the make and break mechanism, a cam being keyed to it for the purpose. By shifting the shaft in its bearings the spark is either advanced or retarded, according to the direction of motion. The helical pinion on the igniter shaft has a great width of face, so that the shaft may be shifted without disengaging the gears. Since the latter have helical teeth a shifting also results in the relative change of angle between any point on the periphery of the cam and any assumed fixed point in the plane of rotation of the cam. In other words, the lead of the cam, so to speak, has been changed. A flywheel governor controls the spark ordinarily; but by means of a lever the governor can be thrown out by the driver whenever he chooses to accelerate speed.

The water circulating pump is positive, driven by helical gears. Its shaft is located at right angles to the cam shaft, and the pump is in a position where it may be readily inspected.

The radiator, which is located in front, has six tubes, about 2 feet long, and copper radiating flanges. The muffler is under the footboard. Six gallons is the capacity of the water tank, while the gasoline tank holds 8 gallons.

The cover of the engine crank case is of sheet brass. A magazine oiler (chain driven) is attached to this cover, and feeds the lubricant to the main bearings of the crank shaft, the crank pin and the piston. It is, therefore, not necessary to turn off the feed of oil when the carriage is stopped.

Steering is effected by means of a wheel with a wood rim. No gear reduction is provided, the main steering link being connected up to an arm on the steering column. Inside of the latter is a shaft that controls the high speed, while a tubular shaft that surrounds the steering shafts controls the intermediate and low speeds. To the right of the steering column is the reverse pedal, to the left the brake pedal. The latter applies the hub brakes, which are of the expanding-ring type and have hardwood blocks inserted in their faces. An equalizing device and a sector and catch make the brake a safe one. Two "panel" levers are provided for the compression relief and the acceleration of the motor's speed.

Batteries, coils and tools are kept in the forward boot, which is large and roomy.

The weight of the car complete does not exceed 1,350 pounds, it is said.

The "Buffalo" Tonneau.

The Bowman Automobile Company, 400 West Thirty-eighth street, New York, are exhibiting the gasoline vehicle manufactured by the Buffalo Automobile and Auto-Bi Company, of Buffalo, N. Y., which our half-tone illustrates.

SPECIFICATIONS.

The wheel base is longer than that of most light carriages of this type, it being 6 feet 2 inches. The tread is 54 inches. No reaches are used in the running gear and both axles are of tubular construction. The frame, which is built up of angles, rests on four elliptic springs. Those in front are 34 inches long and the others are 36 inches. Wire wheels are furnished with the standard machine, but tubular wheels will be fitted at the purchaser's request. For the latter an extra charge is made, as well as for 3-inch tires, the standard machine being equipped with 2½-inch tires with an outside diameter of 28 inches.

The carriage is propelled by a single cylinder horizontal motor rated at 6 horse power. If a tonneau attachment is fitted a 7 horse power engine is employed. The maximum speed on a good road is said to be 25 miles per hour. Both port valves are mechanically operated and jump spark ignition is used. The source of current consists of eight Columbia dry cells, four of which are used at a time.

The control devices are a side steering lever, a thumb lever, located at the top of the steering column, an accelerator pedal that opens the throttle to the carburetor, a foot pedal that applies the brake and a lever on the outside that controls the brake straps of the planetary gears and the main clutch. A small rubber bulb is provided to inject fuel into the intake pipe when starting up. The muffler may be cut out when approaching hills by a sheet metal gate.

The water tank is located under the seat and holds 6 gallons. Five gallons of gasoline may be carried in the tank inside the front boot. The radiator is situated under the footboard. It has eleven tubes and circular flanges.

The seat is 18 inches above the foot-

The Buffalo Tonneau, Buffalo Auto and Auto-Bi Co.

board, 15 inches deep, 38 inches wide and has a high back. The road wheels run on ball bearings and on either Diamond or International single tube tires. A wheel steering device will be fitted in place of the lever at the purchaser's request.

The weight of the carriage is 1,000 lbs.

The Jones Speedometer.

The speedometer manufactured by Joseph W. Jones, of 127 West Thirty-second street, New York, has been on the market for a considerable time, but a number of improvements have recently been made in its construction, and workshop facilities have been secured to turn the device out in quantities.

The speedometer is now made to be attached directly to the steering knuckle, an arrangement already illustrated in THE HORSELESS AGE, and to be attached to the front of the dashboard at the side (Fig. 1). It was found that in large machines with motor in front the distance from the operator's eye to the steering knuckle is too great to conveniently read the instrument. By fastening the instrument to the dashboard and making connection from it to the friction driving wheels by a flexible shaft this difficulty is overcome.

In Fig. 2 are shown the parts which make up the complete instrument. In the centre is seen the dial and around it the driving wheel, which is fastened to the forward road wheel. In the two upper corners are seen the lens and the ring by which the lens is secured in the case. Just below the latter is shown the driving pulley and on the opposite side the rubber ring which is slipped over the pulley. Fig. 3 is a sketch showing the working principle of the device. The shaft A, at the outer end of which the driving pulley

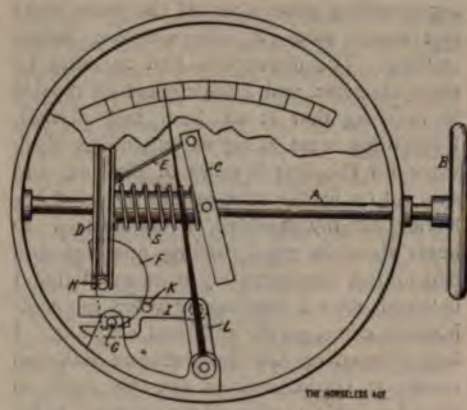


FIG. 3—SKETCH OF SPEEDOMETER.

B is mounted, extends through the casing of the instrument, having bearings in the sides thereof. At the middle of this shaft, within the casing, is pivoted to it on trunnions a metal ring C. To one side of this metal ring a disk D with a long hub is slid over shaft A. The hub of this disk is surrounded by a helical compression spring S, which bears against the disk on one end and against a pin through the shaft on the other. This spring has a tendency to force the disk D and the ring C away from each other. These two parts are joined by a link E and the pressure of the spring causes the ring C to assume an inclined position with respect to the shaft.

The rim of the disk D is grooved and with the groove engages a pin H on a cam disk F which is pivoted at G to a stationary bracket. The cam coacts with a pin K on the rod I. This rod I is pivotally connected at one end with a lever arm L and guided at the other end by the pin G. The lever arm L is fastened to the stem of the indicator hand.

When the shaft A is revolved the ring C has a tendency to set itself at right angles to the shaft. The spring S is compressed and the disk D moves along its shaft, thereby slightly turning the cam F around its pivot at G. The cam pushes the rod I to the right and thus causes the indicator hand to sweep over the scale. A small spring on the stem of the indicator hand (not shown in the drawing) always keeps the pin K against the cam surface.

The scales are printed, but every instrument is calibrated separately. This is done as follows: The cam F is made in the first place with extra stock around the cam surface. The instrument is completely assembled with the exception of pin K. The pointer is set to the scale reading of 5 miles per hour. By means of a shop device for producing a constant speed the shaft A is then revolved at a rate corresponding to 5 miles an hour. A mark is then scratched on the cam through the opening of the rod I, in which the pin K is to be fastened. Next the pointer is set over the 10-mile mark on the scale and the same process repeated; then for 15, 20, 25, and so on. By this means a succession of marks are obtained on the cam, which permit to cut a very accurate cam surface.

The working mechanism is completely inclosed in a nickeled case. The instrument is made for wheels of 28, 30, 32 and 34 inches diameter and can be fitted to practically every make of machine.

Charles Hall, of the Toledo Motor Carriage Company, Toledo, Ohio, has devised a portable tonneau seat similar to a surrey seat, but having a jointed lazyback. It is designed to take the place of the two corner seats, and is laid on the two supports for the cushions at either end of the tonneau. When those on the rear seat desire to alight, the seat is lifted upon end and the passenger has but to step out. Three people may then ride in the rear seat.

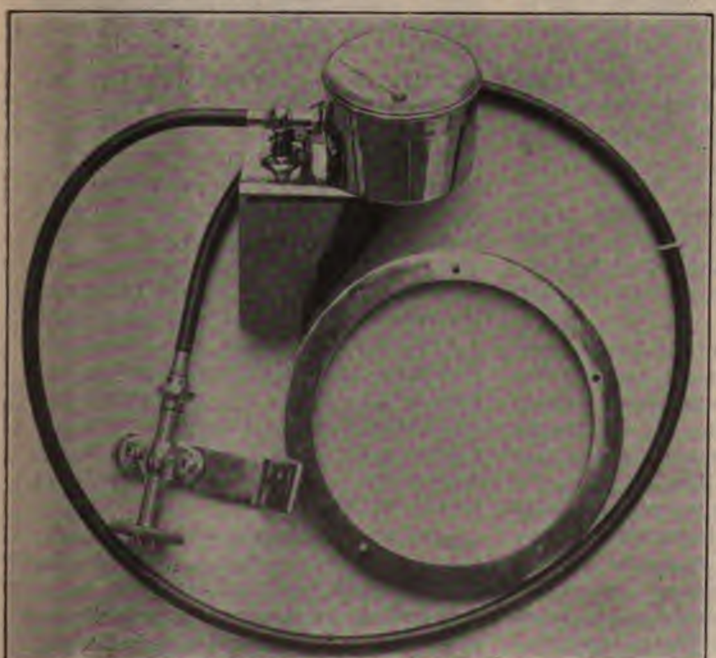


FIG. 1.

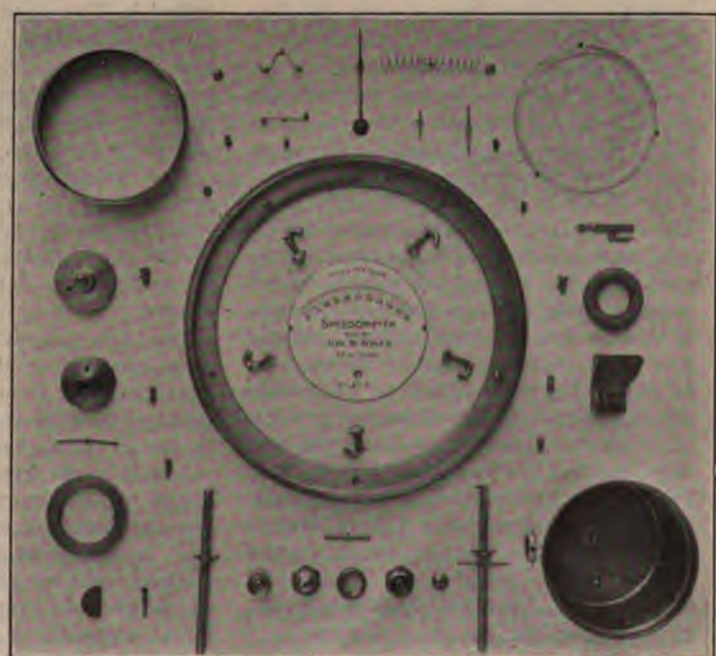


FIG. 2.

LESSONS OF THE ROAD

3,500 Miles With a Light Gasoline Carriage.

By Harry B. Haines.

There are thousands of would-be auto owners all over the country, who are looking about, anxious to secure some sort of a vehicle, and unable to decide on just what kind of a machine they want, and hundreds of these are looking favorably upon the so-called runabouts, which are pretty to look upon, comparatively noiseless in operation, and reasonable in price.

I was among the first here to get the noiseless, light built, cheap priced auto craze, and before long I had ordered a machine. It was guaranteed to run over any sort of a road and to take you there and bring you back, but I am in a position to testify that it has often taken me there and then, satisfied with its performance, allowed me to take it back as best I might.

I have already written in these columns about my experiences in learning to run this machine, which was of the gasoline variety and water cooled, and for the benefit of my fellow automobilists I intend to narrate a few of my troubles which emanated, not from my carelessness or misuse of the machine, but from defects of the vehicle in question.

The first week of operation with my bargain price auto was bliss itself, and I often look back and regret that I did not take the offer of a fellow enthusiast who offered me $50 more than I had paid for the machine, because he was unable to get one from the factory without waiting a month. Incidentally I sold it last week at a loss, and I have as souvenirs bills for repairs, which amount to something like $100 and extend over the time since January 1 to the present.

WEAKNESS OF FIBRE GEARS.

My first real trouble was the stripping out of a set of fibre gears, the low speed of my machine being attained by the meshing of four fibre pinions into a steel gear wheel which is keyed on the main shaft. These gears are entirely inadequate for the work they are expected to perform and the teeth tear off, or, in other words, "strip," when any great amount of strain is brought to bear on them, as when starting suddenly with one or more persons on the machine, or throwing in the low gears on a hill when the carriage is running slowly, or, perhaps, throwing in the low gears when the carriage has not yet been brought down to low gear speed by a liberal use of the brake. Under all these conditions I have learned to my financial embarrassment fibre gears are not strong enough, and altogether I have six sets of stripped gears to my debit at an average cost, put in, of $6 a set.

I started out one day some months ago with a friend to run over to New York, having carefully gone over all the loose bolts and shaky parts of the machine before starting. The distance is just 14 miles by the cyclometer, and I anticipated no trouble in covering that in an hour and a half. Everything went along as smooth as clock work for the first 8 miles of the run, and spurred on by the extraordinarily good behavior of my machine, I commenced to boast about its good running qualities, and had almost convinced my companion that I believed what I was saying when my punishment came, swift, sure and crushing. I had stopped on the Susquehanna Railroad tracks at Hackensack to ask the road to Fort Lee, this section of the country being strange to me. The motor was buzzing along gloriously with the gears thrown out, and my spirits were at their zenith. I was shown the road and leaned leisurely back in my seat. I pressed my foot on the speed accelerator and advanced the spark, as per directions, and then slowly and gently—very slowly and very gently in fact, as I was then on my third set of gears—I pulled the gear lever up and waited for the machine to start. There was a second's pause, which seemed like an age to me, and then with a horrible roar, such as nothing but stripping gears could cause, the carriage shot ahead and then stopped short, the motor racing like mad.

I realized only too well what had happened, and I calmed my frightened companion and broke the news to him gently. Luckily for him we were near a railroad station, and I bought a ticket and waited for a train to send him home on. He left wishing me good luck in getting my machine home, and I started the trip back to the repair station at home. There were still a few teeth left on the low gears, and by running alongside the machine and letting it take itself up hills and then climbing in and speeding down the other side and along the level with the high speed clutch locked in, I managed to reach a point about a mile from home. Here the last of the gear teeth were chewed off and I was stalled, a 10 per cent. grade standing between me and my dinner, which was then two hours past due.

A telephone message to the repair station brought out a steam vehicle, which towed me home, and for the first and only time in all my varied experiences I was unable to reach my destination with my own power.

The climax of my gear stripping experiences occurred on the same road to the Fort Lee ferry a month ago, but this time I was 12 miles from home and just getting up the last grade before running down the mountain to the ferry. The low gears tore out as we were starting the grade, and the machine started to roll backward down the hill. I jammed on the brake and held the machine until my companion jumped out and blocked the rear wheels with a stone. It was impossible to start on the high speed on a grade, and we were stalled again. For a half hour or more we sat there not knowing what to do, listening to the derisive shouts of passing boys and trolley car motormen to "git a hoss." We would have been more than willing to have borrowed, begged or stolen any sort of an equine, but there seemed to be none in the neighborhood. Finally, driven to desperation, we realized that it would be useless to go back, and that the only thing to do would be to get the machine up the hill and then run down to the ferry and seek a repair shop in New York. We decided to ask the next trolley car motorman who came along to tow us up the hill, and with that idea in view we stopped the next car which hove into view, bound toward New York. The motorman, in language more expressive than beautiful, informed us that his car "wasn't no steam engine, and that we ought to buy a decent machine," and with that he put on his power and left us, the passengers smiling broadly, as they swept by.

The next motorman was a bit more polite, but the result was the same, and we sat down to wait for the coming of some specimen of "the old reliable." It finally hove into view attached to a farm wagon, and after considerable parleying we managed to get the horse unharnessed and attached to the front of our machine. The animal started up willingly enough, but the load seemed too big, and its owner was about to leave us in the lurch again when we prevailed upon him to try once more by offering 50 cents bounty in addition to the dollar already promised. I got around at the rear to push while my companion secured a fence rail, which he used as a pry bar. Then at the given word we all got down to work and the machine hesitated slightly, and then, much to our joy, moved.

By the dint of hard labor, language and a general loss of self respect we got our "lightweight" runabout up the hill and settled with the engineer who owned the "hay motor." We finally got our motor started again and succeeded in reaching the ferry, and here found that we must wait ten minutes for a boat. I stopped the motor and sat back as comfortably as I could, realizing the wreck under the seat. The usual crowd gathered around to look over the machine and ask all sorts of fool questions, as to how I liked it, and did I have much trouble, or did it cost much to run? The arrival of the boat finally put an end to this rapid fire of questions, and starting up the motor again I prepared to go aboard. I could not start on the high speed and finally, fearing that the boat would go and leave me, I jammed on the reverse and swept around in a broken circle to the gate entrance, only to be held up by the guard, who wanted to know if I couldn't run aboard the other way.

After several minutes' argument I finally succeeded in making him understand what stripped gears were, and also the effect they had on the carriage, and I was allowed to go aboard, backing painfully up the long slope to the boat, the tide being in. On the New York side I backed off the boat and

then through the city streets at about 3 miles an hour. It took forty minutes to reach a repair station on Eighth avenue, and once there I left the machine for repairs, taking the advice of the expert to have gears cut out of solid brass put in the machine. I returned home on the train and a week later, in response to a postal received, went down to the repair station to get my machine. A bill for $12 was the first obstruction met, and that disposed of I was allowed to come into possession of my own.

The motor started with the gears humming beautifully, but when I threw them into mesh, the clash of the brass against the steel raised a racket which could be heard a block and made me think that the machine was about to meet the fate of "the wonderful one hoss shay." I stopped the power, and on being assured that the noise would disappear when the gears were worn down I tried it again and the auto started out of the shop howling most dismally. The prospect of the 14-mile run home was not a very bright one, but I kept right along and reached the ferry without mishap. Once on the other side the long climb up the Fort Lee hills started. A liberal injection of oil had toned down the noise of the gears considerably, but there was another difficulty yet to come. My motor developed scarcely one-half its rated power, and when half way up the hill the carriage stopped, the motor refusing to carry the weight. My companion got out and blocked the wheels, and then gave the motor a start. I waited until it was well speeded up and then, as he resumed his seat, I threw in the gears. The carriage went forward a few feet and then the motor stopped again, but there was no stripping of gears, and I realized that at last I had solved the transmission problem and that my troubles in this respect were at an end.

To return to my story, the back wheels were blocked again and the motor started with only myself in the machine. The carriage, relieved of the weight of one passenger, started up slowly and gradually gained speed. I rode up the hill, my friend tagging behind until within about 100 feet from the top, and then the motor, overloaded, stopped again. I tried several times to make it take the hill, but it was no go, and I finally got it over the grade by getting out and letting the machine take itself up the hill, which it did assisted by my friend, who pushed in the rear.

We finally reached home after three hours of low gear grinding, the men at the repair station having broken one of the arms off the high speed friction clutch, greatly reducing its clutching powers, and having forgotten (?) to mention the matter to me.

My road troubles—and I have had many of them in the 3,500 miles that I covered with this machine—would fill a volume, and are not of sufficient general interest to warrant reproduction in this article.

Let it suffice to say that I have seldom, if ever, returned from a run without finding one or more body bolts jarred out along the road, that I have never run for a single month without breaking some small part or finding my flimsy water cooler sprung aleak and the gasket burned out of my cylinder head as a result. To replace this gasket means to take off the whole rear of the motor, and is a ten or twelve hour job, and not a pleasant prospect with mechanics receiving 50 cents an hour. Wire spokes I have snapped off by the dozen, and I have yet to make a long run, say 25 miles or more, without being stalled somewhere along the route by a broken wire connection on some part of my battery system.

My machine as it stands to-day after five months' use is a striking example of what American roads will do to a light auto. The front axle is sprung out of true, the wire spoke wheels make serpentine tracks and the running gear creaks dismally. The flywheel—for mine is a single cylinder engine—has a habit of working loose and causing the machine to pound and the expert to swear, as the bolts are so peculiarly situated that they cannot be reached with a wrench and must be tightened by tapping them with a cold chisel and hammer. I might also describe the oiling system, some of the holes of which could not be found with a microscope, and tell how the planetary gears throw the oil out of the gear cases and over the entire carriage, but there is no good to come from too much harping on disadvantages. The auto is not perfect, nor are the men who run them, and perhaps the best teacher is experience, after all. I believe that it has been in my case.

Report of the N. A. A. M.

At a meeting of the executive committee, held at the office of the association on June 3, the following report was made by the treasurer and accepted. It covers the period from the date of organization to May 15, 1902:

The receipts from November 10, 1900, to May 15, 1902, amount to $7,660.85, including the association's share in the net profits of the Chicago show, which amounted to $4,841.85. The total expenses to date have been $3,623.15, which leaves $4,037.70 cash on hand.

The membership has grown from 23 active and 15 associates, or a total of 38 members on November 10, 1900, to 45 active and 67 associate or a total of 112 members on May 15, 1902.

The association has succeeded in securing a reduction of about 50 per cent. in ocean insurance rates. The following are the rates on first class lines of Atlantic steamers and approved steamers to Australia and New Zealand:

To ports in United Kingdom and Continent of Europe, between Bordeaux and Hamburg, inclusive, 17½ cents per $100 invoice value.

Mediterranean ports not east of Sicily, 25 cents per $100 invoice value.

Australia and New Zealand, 50 cents per $100 invoice value.

South America, 25 cents to 35 cents per $100 invoice value.

The rates on second-class Atlantic steamers are about 15 per cent. higher than first-class rates.

The first-class Atlantic lines are: American, French, North German Lloyd, Cunard, White Star, Atlantic Transport, Red Star, Allen, Hamburg-American Packet, Johnston, Wilson-Furness-Leyland, Netherland-American, National and Warren. The second-class lines are: The Mississippi, Dominion, Anchor, Neptune, Donaldson, Chesapeake & Ohio, Scandinavian, Cosmopolitan, Philadelphia Transatlantic.

T. H. Russell, general insurance broker, 76 William street, New York, who gives the ocean rates quoted above, names a rate of 3 per cent. for insurance on automobiles against fire. This rate covers a vehicle anywhere in the United States.

An Up-to-Date "Garage."

The new building put up by Pa-Delford & Bell as an automobile garage, at 250 West Eightieth street, New York, is now thoroughly completed. It is a three-story and basement structure, containing every possible convenience and facility for storing automobiles and for repair work of all kinds. The repair shop on the lower floor is well equipped with high class machine tools and is in charge of experienced workmen. The total floor space for storage purposes is 10,000 square feet. In the electrical department are ample facilities for charging machines, two expert electricians and battery men being employed.

The firm have a 15 horse power Panhard now under consignment, and are arranging for further foreign deliveries. They have the agency for Columbia electrics and handle all makes of vehicles, gasoline, steam and electric. They also carry in stock parts for the more important makes; while in their wood-working department they both make and repair bodies, including painting, lining and finishing in first-class style.

Foreign Owners May Enter Automobiles Free of Duty.

The customs division of the Treasury Department has prepared a circular, signed by Secretary Shaw, permitting foreign owners of automobiles to bring them into the country for personal use during a period of three months from date without payment of duty. A bond will, however, have to be left with the collectors of customs at the port of entry for double the amount of the duty which would be levied, and this bond will be cancelled only upon proof that the automobile which it covers has been exported.

The Dayton Auto-Electric Company has been incorporated under New Jersey laws with $600,000 capital to manufacture electric vehicles.

...COMMUNICATIONS...

Proportion of Liquid Gasoline to Air for Perfect Combustion.

PHILADELPHIA, June 24.

Editor HORSELESS AGE:

If you have the data at hand will you kindly inform me what is the maximum quantity of liquid gasoline allowable per cubic foot of air for perfect combustion? Also, how small a fractional part of this maximum quantity could be depended upon for an explosive mixture? Would the rules (for proportion) applying to gasoline differ materially for kerosene?

I. W. H.

[The correct proportion of liquid gasoline to air is 12.4 parts to 100,000. One cubic foot of air would therefore burn .214 cubic inch of gasoline. A mixture containing about one-half this proportion of gasoline is still capable of being ignited, but burns very slowly. The correct proportion of kerosene to air is about the same—very slightly less.—ED.]

That 25,000-Volt Generator.

CHICAGO, June 23.

Editor HORSELESS AGE:

We desire to correct a misstatement made on page 714, issue June 11, regarding the "Cotton High Tension Generator." In the description we furnished you we stated that this generator is "designed to furnish a powerful jump spark direct from dynamo to plug without the intervention or use of other apparatus, such as spark coils, etc." We also stated that "the current is taken direct from the generator terminals at a pressure of 25,000 volts, which is sufficient to force a powerful, hot, flaming spark through over an inch and a quarter of air space." * * * "the generator is entirely inclosed and self contained."

Referring also to V. G. Apple's prompt charge of "falsehood" in your issue of June 18, we can substantiate any statements made by us, and we did not claim in our statement to dispense with the use of a coil. We will further say that so far as our Cotton high tension generator is concerned, there is no resemblance to the "Apple" machine beyond the fact that they both generate electricity. The Cotton high tension generator has a stationary transformer in its base, which is an integral part of the same, and is constructed with a compound field, direct-current armature and additional alternating armature on the same shaft. The magnetic field of this machine will not weaken, as is the case with most low tension generators, as it is compound wound and the field current is furnished entirely independent of any service that the machine may be called upon to render. Further, this machine is entirely different from anything ever put out by the Dayton Electrical Manufacturing Company.

F. L. BLIGH.

[By comparing the above quotations from the descriptions sent us and the note which appeared on page 714 of our issue of June 11, we fail to notice any misstatement in the latter.

The two statements above, "current is taken direct from dynamo to plug without the intervention or use of other apparatus, such as spark coils, etc.," and "The Cotton high tension generator has a stationary transformer in its base which is an integral part of the machine," appear inconsistent, as it is to be presumed that the current passes from the generator into the transformer, or coil, and the high tension is generated in the coil and not in the dynamo. While the coil may be an integral part of the generator mechanically, electrically it is a separate organ, which at present it is impossible to dispense with in jump spark ignition.

To say that "the current is taken direct from dynamos to plug" is just as incorrect as it would be to consider the generator an integral part of the coil and say: The coil generates its current itself and sparks the engine without the intervention of other apparatus, such as current generator, etc.—ED.]

Has Trouble With Muffler Explosions.

Editor HORSELESS AGE:

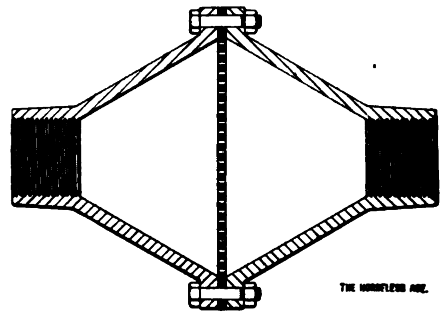
Would you kindly give me and your many readers some advice about mufflers? I use a gasoline carriage of 1900 type which I have had in service for about two years, and although I have not been so unfortunate as our very interesting friend Damon, I had my troubles. My last was with my muffler, which after doing all right for two years suddenly burst open with a loud report and which ever since, and although all open, explodes, almost every time the carriage starts or stops, so that I feel as if I were firing salutes like a warship.

None of the wise men we have here seem able to account for it, not even the agents. They say my battery is weak and that I miss ignitions, which is no doubt true. But I have a very fair spark and plenty of power, and I have run with far weaker spark for months and months without explosions. We have tried all degrees of mixture—weak and strong. As a last resort I put a long pipe connection between the cylinder and muffler. This helped me a great deal, but still I have some explosions and almost always when stopping or starting. Can you give me any points? If so, you will much oblige a steady reader of your very interesting paper.

P. G. HUBERT.

[If you had an explosion in the cylinder every time a charge is drawn in, no explosive mixture would ever get into the muffler and you would not have any muffler explosions. That you have muffler explosions is, then, a sure sign that the ignition is faulty. Try a new battery; clean the spark points and see that the igniter is timed correctly and the springs on the igniter are in good shape.

Of course, if you stop your engine for a short period, an explosion is always likely to occur in the muffler when you start up again—that is, in case you stop your engine by opening the spark switch, because the engine will, as a rule, turn over quite a few times after the spark is interrupted and thus pump explosive mixture into the muffler, which is ignited by



the exhaust flame when the engine is started up again.

If overhauling the ignition outfit as above suggested does not remedy the trouble we would suggest the following: Have two funnel shaped castings made (see Fig.) with radial flanges at their wide end. Bolt these two together, with a piece of ⅛- or 3-16-inch sheet steel between drilled full of holes with a drill about No. 32. The total area of these holes should be somewhat greater than the cross section of the exhaust pipe. The smaller ends of the two castings are tapped out to fit the exhaust pipe and the device is inserted in the exhaust pipe midway between engine and muffler. This should entirely do away with explosions in the muffler.—ED.]

Efforts in Behalf of a Liberal Speed Ordinance in Philadelphia.

PHILADELPHIA, June 24.

Editor HORSELESS AGE:

As you have no doubt noticed a very objectionable ordinance was introduced into the Philadelphia Council last week. It will be passed in some form within the next few days, and so we had to work quickly and fast. A few of us gathered at the residence of Barclay H. Warburton, the proprietor of the *Evening Telegraph*, last Saturday night; we had copies of the automobile laws of the various States, and also those of England, France and Germany, and we drafted a counter ordinance. A meeting of the trade was called at Mr. Warburton's house Sunday afternoon and all the trade interests of Philadelphia were represented. After some slight changes, the ordinance as passed the night before was approved.

A meeting of the Philadelphia Club was called for yesterday afternoon, and they also approved the ordinance. We are to have a non-stop contest this afternoon, and the ordinance will be presented to the council to-morrow afternoon. E. B. Gallaher was selected at the meeting of the trade to present their interests to the council, while Mr. Stoughton will represent the club.

The ordinance we are working on, as a substitute for the one presented last week, is much more liberal as to speed, but more strict as regards the qualifications of the operator. In fact, it is modeled almost entirely after the French law.

We do not wish to boast about it in advance, but if we can carry this through—and we have some very powerful interests at work in its favor in this city—it will be the greatest thing for automobile users that has ever been done in this country; that is, to license the operators and put the restrictions on the qualifications of the operator and then allow a competent operator to run at a reasonable speed.

Mr. Gallaher had Mr. Patton, who introduced the original ordinance into the council, and also Director of Public Safety English, with him in an automobile for several hours yesterday afternoon and demonstrated to them that a competent operator can go through the streets with perfect safety at a much greater speed than horse drawn vehicles. W. D. Gash.

Flywheel Weight.

Reading, Pa., June 28.

Editor Horseless Age:

Your remarks on flywheel weight may possibly be misunderstood, particularly when you say that an engine with too small a flywheel vibrates excessively. In considering vibrations of an engine in a motor vehicle, we are interested only in those vibrations which affect the vehicle, and they are two kinds—the reaction of the impulse, which being expended against a heavy flywheel tends to revolve the body of the vehicle in a reverse direction, as you have correctly stated in a recent issue; and the jerk or impulse transmitted to the vehicle by the suddenly increased speed of a light flywheel under the forcible impulses of the explosion. Both of these forms of vibration are objectionable and the most satisfactory vehicle is the one which most nearly strikes the mean position between the two. Of course, this mean varies according to the speed of the motor and if the motor is a high speed one the flywheel may be much smaller than if it is a low speed one, but this best mean design must always be kept in mind and a distinction must be made between a jerky propulsion of the vehicle due to a light flywheel and vibrations in the vehicle arising from the use of a heavy flywheel. While your statement is correct that a heavy flywheel increases the range of the motor because it permits the motor to be run at slightly slower speed, it does not of necessity follow that a heavy flywheel motor can be run at lower speed in a vehicle under all circumstances, and it is a fact which we have frequently observed that the light flywheel is more advantageous on rough streets where frequent slow downs must be made for gutters, than is a heavy one; for with a light flywheel the vehicle can be brought up almost to a standstill and yet have sufficient momentum to keep the motor from stopping, while the first few explosions will speed both motor and vehicle up to a fair rate and permit quicker getting away. On this account we prefer the light flywheel. It is true that, as you state, a light flywheel at slow speeds permits a perceptible stoppage between explosions, but with a triple cylinder motor this is of but little importance, and more than counterbalanced by the added flexibility of the vehicle.

We have tried the effect of removing a heavy flywheel and substituting a light one and find that the difference is much the same as lightening the load of the vehicle, in that it enables the motor to more perfectly control the vehicle so far as the matter of quick stops or quick starts is concerned. In short, it increases the effectiveness of a throttle control and more nearly approximates steam engine results.

Further, at all speeds, down to such slow ones that the separate impulses of the motor may be felt as separate jerks on the driving mechanism, the vibration is less than with the large flywheel, for since the flywheel is light, the expansive effort of the explosion drives it forward with little reactive jerking effect on the vehicle. This feature is the one that must not be misunderstood. No theorizing is required to prove this, for it is well known that a blank cartridge does not produce recoil; so a light flywheel or none at all reduces the vibrations of a motor due to the reaction of the impulse to a minimum.

Charles E. Duryea.

Steam Condensation in Automobile Service.

Editor Horseless Age:

In your June 25th issue you publish another communication from Mr. A. H. Woodward on the condenser question. In my letter which he refers to I had occasion to point out the evident fact that a greater difference in temperature would result in a greater rate of condensation per unit of surface. Let Mr. Woodward figure a little in the other direction until no difference in temperature exists and ascertain what the rate of condensation will be. Mr. Woodward's attempt to construe my words to mean that "heating the exhaust would increase the condensation" is so faulty in argument that further comment becomes unnecessary. I will, however, again call attention to the fact that the quantity .003 relates to *saturated* steam.

In your same issue Mr. Bickford states that I have "dropped into one or two somewhat serious errors." After making a quotation from my article of May 14 (it is unimportant that he omits the word "heat") he says that the statement in the strictest sense is correct, but proceeds to show how by changing the wording a different meaning could be conveyed. The practical application of the experiments referred to was fully discounted by me, as reference to my article will disclose. Mr. Bickford is kind enough to state that I am not far wrong as far as the efficiency of an air condenser is concerned. After a careful reading of his article it would seem that the "errors" he has found are dependent upon the unwarranted construction of the meaning of the words quoted, and upon the assumption that I hold unwarranted but unexpressed views or opinions upon the significance of the Leslie cube experiments. That piece of laboratory apparatus known as Leslie's cube in the hands of such investigators as Sir John Leslie, Melloni and Tyndall has contributed much to our knowledge of radiant heat, and I am quite willing to accept the results until a greater investigator proves them in error.

Having had occasion during a period of several years to make a large number of experiments and tests on the subject of condensation in pipes in connection with steam heating and other plants, including trials of air condensers, and also to investigate the merits of various non-conducting pipe coverings, I obtained considerable data which agreed closely with results obtained by Burnat and Anderson. Hopkins' figures for correction were verified very closely. On numerous occasions calculations for condensation in pipes were made that were proven correct within less than 5 per cent. upon test. Conditions were, of course, known and uniform, and unlike, in this respect, an automobile condenser in service. Arthur L. Stevens.

Foul Spark Plugs.

Chicago, June 28.

Editor Horseless Age:

Referring to your editorial on page 720, issue of June 18, relating to causes of stops in the recent non-stop contest of the A. C. A., we desire to call your special attention to that portion in which you state truly that "Many of the ignition troubles resulted from dirty spark plugs," and, again, "It would thus seem that the ignition outfits * * * are the most delicate parts of present gasoline automobiles."

In connection with the first quotation we will say that this particular trouble is practically universal, and that until quite recently there has been no satisfactory device or invention produced which would obviate this objection, and that can be counted on to give continuous satisfactory service. The exception we make is an article recently perfected which we manufacture, described by you on page 714, issue

June 11, and known as the Cotton Duplex Igniter. We have taken the trouble to write you in regard to this, as the C. D. I. performs a special function for which there is a distinct need, viz., the keeping of the spark plug clean from deposits, and also because you adversely criticised the article without properly understanding the same. We are sure that as you published the criticism under a wrong impression you will also be willing to explain the actual facts.

It appears you assumed the compression was affected, and made variable by the igniter, while as a matter of fact such is by no means the case. The igniter in no way varies the compression; it has no appreciable effect on the same, and whatever effect or alteration exists is a constant factor. The cubic contents of the entire receptacle is so small compared to the size of the cylinder that it makes no practical difference in pressure of compression—no more so than the hot tube, which is a known quantity. L. L. BLIGH.

The Power Rating of Steam Carriages.

Editor HORSELESS AGE:

Will you please tell me through your columns just how the horse power of a steam vehicle is figured?

Taking the ordinary formula I. H. P.$=\frac{Plan}{33,000}$, so many different results can be figured out. P, the mean effective pressure, can be taken at most any number of pounds, and the point of cut-off and cylinder condensation not taken into consideration at all; n can be varied from 0—200 (being twice the R. P. M.). If your machine is standing still (you may be in mud up to your hubs or you may be half way up a 20 per cent. grade) n certainly should be equal to 0, as you haven't got the momentum of a flywheel as in a stationary engine, where the R. P. M. are nearly constant. But in this case P could be taken at boiler pressure, as it is the force acting on the area of your pistons. l and a in this case, as in any other, wouldn't change. It seems to me that this would be the best way of figuring the I. H. P. of steam machines rather than taking n as the maximum or mean number of revolutions. When you are speeding along at 15 miles an hour it isn't necessary to think of the horse power, but when you get stuck and have to work your reverse lever backward and forward two or three times or have to get out and use your shoulders (which bystanders are apt to call jackass power) you are apt to think of the horse power you are supposed to have.

It would be interesting to me, and possibly to some of your other readers, if you could find out the prevailing practice of the different steam companies, and it might bring about a standard practice so that we could do our own figuring in the future.

If we had the A. S. A. E. these things could easily be made standards.

ADOLF A. GEISEL.

[The horse power rating of steam carriages depends more upon the boiler than upon the engine. In most cases the engine is capable of giving more than twice the rated power. But if working at that rate the boiler pressure would soon drop and the engine power decrease.

In our opinion, the best method of rating the power of a steam carriage would be by the power the boiler and engine would furnish continuously when working under the most favorable conditions, and this is the method employed by most manufacturers, we believe. One manufacturer of steam carriages tests all his engine and boiler outfits on the testing floor prior to mounting them in the vehicle, by driving a dynamo with them furnishing current to electric incandescent lamps. The test is continued for a considerable time and the load is figured at the rate of ten 16 candle power lamps per horse power, run up to full voltage. That is to say, with a 6 horse power outfit a dynamo is driven furnishing current to sixty incandescent lamps of 16 candle power and lighting them up to their normal brilliancy.

It would not be possible to rate the power of the carriage to represent the conditions when stopped. When the number of revolutions is zero the horse power also is zero.—ED.]

Gasoline Consumption.

Editor HORSELESS AGE:

As your correspondents frequently mention gasoline consumption in steam vehicles, I offer the following recent experience of my own, as indicating the difference between continuous running and frequent firing up from cold water for short trips. On June 18 I filled gasoline tank of my steam carriage full. During that and following day I ran a total of 38 miles in three separate trips (firing up three distinct times), and allowed carriage to stand with pilot light burning for considerable periods. On June 20 I filled tank, and required 6 gallons of gasoline to do so, this showing a mileage of only 6 1-3 miles per gallon. I then started and ran by odometer a distance of 40½ miles over hilly country roads (the previous two days had not been off asphalt and macadam, though all roads hereabouts are hilly), making no stops except for frightened horses on two occasions, and once to see whether water enough remained in tank to carry me home, getting back in 3 hours 10 minutes from start. I at once refilled gasoline tank, and could get in barely four gallons, showing mileage was fully 10 per gallon. READE W. BAILEY.

Legislative and Legal.

Newark, N. J., freeholders recommend a speed limit of 10 miles an hour.

Springfield Township, N. J., has passed an ordinance limiting speed to 10 miles an hour.

A proposition to tax automobiles at the rate of $5 a year has been declared illegal by the city solicitor of Newcastle, Pa.

The city council of Modesto, Cal., has passed an ordinance limiting the speed of automobiles within the city to 8 miles an hour.

Atlantic City, N. J., authorities are preparing an auto speed ordinance with an 8-mile limit for the crowded district and a 10-mile limit for the outlying district.

It is said that Oliver Harriman, Jr., White Plains, N. Y., intends to test the constitutionality of the law under which his chauffeur was recently fined for excessive speed.

Residents on Bedford avenue, Brooklyn, are circulating a petition for more police protection from scorching automobilists, who, it is claimed, almost monopolize the thoroughfare.

The first arrest under the new Cleveland ordinance was made last week when the chauffeur of a wealthy resident was apprehended without the required number on his machine and was locked up.

Edward Copeland Wallace, of New York, was fined $25 at Nyack, N. Y., Saturday for running his automobile at illegal speed and causing a runaway. A suit for $25,000 damages is also pending against him. It is said he will appeal.

E. H. Hall, an automobilist of Dover, N. J., has gained the approbation of the press because, when his automobile caused a runaway and several persons were injured thereby, he went to their assistance instead of running away, as too many have done.

The committee appointed by the citizens of Hackensack, N. J., to draft an automobile ordinance has reported in favor of a speed of 8, instead of 12 miles, and a fine of $50 for the first offense and $100 or four months' imprisonment, or both, for the second offense.

At Patchogue, L. I., an organization of fifty prominent citizens called the Town of Brookhaven Committee of Safety has been formed to devise measures to restrain automobilists from the abuse of the common road rights. Special deputy sheriffs have been appointed with power to arrest offenders.

Many of the towns in Westchester County are reported to have combined to hire watchmen to patrol the principal highways and watch for automobilists who violate the law. It is said that signal stations will be established connected by telephone, so that the officers can communicate with each other when any law-breaking automobilist comes along, as has been done in England.

The Jenkintown (Pa.) Borough Council has fixed 10 miles as the limit for automobiles, with a $10 fine for violation.

Milwaukee, Wis., has drafted an auto ordinance making 5 miles the legal speed in turning corners and 8 miles on a straightaway.

A number of the prominent summer residents of Newport, R. I., have sent a petition to the police praying for the enforcement of the law against fast driving of automobiles.

The citizens of San Mateo County, Cal., are so incensed at the accidents caused by automobiles in their county that they threaten to resort to shotguns to compel automobilists to avoid San Mateo County.

The village trustees of South Orange, N. J., are drafting an automobile ordinance with a 10-mile speed limit and a penalty of $25 for the first offense, $100 for the second and $250 and thirty days in jail for the third.

North Attleboro, Mass., which is on the main road between Boston and Providence, is up in arms against the breakneck speed at which automobiles are constantly run through the town. Warning placards have been posted by the selectmen.

The French chauffeur of Clarence H. Mackay has spread consternation among the residents of Roslyn, L. I., by his reckless driving. Many accidents have resulted from his dare-devil pace and threats of bodily injury to the offender are heard.

At Covington, Ky., last Thursday, T. W. McCullough was awarded a verdict of $1,020 damages against Clifford Shinkle, a wealthy Cincinnatian, whose automobile caused McCullough's horse to run away, smashing the buggy and injuring the plaintiff.

E. C. Wallace, the wealthy New Yorker, who is being tried at Nyack, N. Y., on a charge of violating the automobile law of the State and thereby causing an accident in which E. T. Lovatt and wife were injured, testified last week that the automobile belonged to his thirteen year old son, who was an expert in handling it, and who was operating it at the time.

The city treasurer of Pittsburg has had trouble in collecting the vehicle tax from automobilists. There is no special automobile ordinance in the city, but automobiles have been taxed under the old law, which some owners claim does not legally cover automobiles. Forty-five owners, many of them prominent citizens, were recently proceeded against by the authorities for delinquency.

Several New York daily papers announced recently that Dr. William B. Gibson, coroner of Huntington, L. I., carries a revolver and threatens to shoot any automobilist who refuses to slow up and get to one side of the road while he passes with his spirited team. He has secured a justice's permit to carry a revolver, and relates one case where he had occasion to drive an automobilist into the field with it.

...OUR... FOREIGN EXCHANGES

Touring Car Bodies—III.

[Read before the Automobile Congress at Dijon by Léon Anscher.]

From the preceding we arrive at the conclusion that the touring car should belong to one of the other of two classes—the canopy-top vehicle or the limousine. The choice between the two should be determined by the nature of the trips it is proposed to make—that is to say, the kind of touring one wishes to indulge in.

The canopy top, it is true, is less protecting in case of persistently inclement weather; in cold weather and when nights are passed on the road. On the other hand, it is more easily detached; the occupants have a freer view in all directions and greater facility for communicating with each other; and, finally, the weight is less. The limousine insures complete protection in its rear inclosed seat. Invalids and ladies may travel in it with comfort over long distances. One may sleep in it. if necessary. It resembles, at least as far as its inclosed part is concerned, the coupé of our old diligences. It is heavier, but it presents the advantage that it may be used not only as a touring vehicle but a city vehicle for winter use as well. Although one is in a limousine more inclosed, and sometimes too much, it owes its popularity to its diverse advantages.

The tourist who only uses his vehicle during the summer does not meet the same conditions as the one whose leisure permits him to travel at any season of the year. He who only covers a territory of limited radius, without ever venturing too far from a fixed point of supplies, is led by different considerations than the globe trotter who continually visits new countries. Finally, the young men would find exaggerated the provisions for comfort and protection against weather which elderly people would consider a minimum. Each case, then, has its own solution.

One thing I cannot recommend to the tourist in any case, and that is a compromise called a detachable body or combination open and closed body. They are of no use to the tourist. With a limousine in which the top part can be removed this possibility could not be taken advantage of when on a tour, as one would not know what to do with the top, except, perhaps, shipping it back by railroad. If, on the other hand, one has started out without the cover and the weather turns bad so that it is required, one must frequently have it shipped—always by railroad—a great distance.

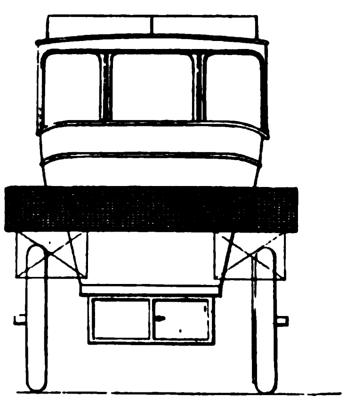


FIG. 1.

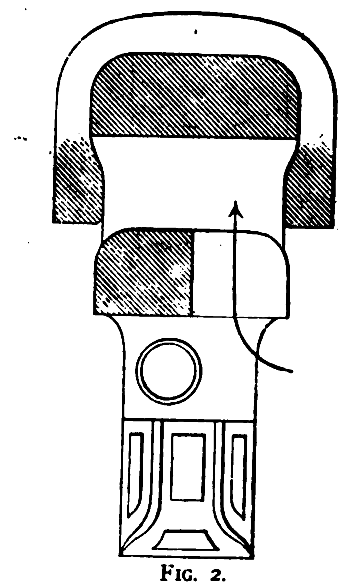


FIG. 2.

Finally, experience has taught us that with detachable tops the joints between the detachable and fixed parts become loose and this produces a most undesirable effect; and if by chance the tongue part of the joint should swell under the influence of moisture the joint will bind and the detachable feature becomes questionable. Let us, therefore, leave out of consideration city vehicles in which it is sought to combine suitability for both summer and winter use.

I think it advisable, before completing this paper, to indicate by an example the the majority of the details which complete the touring car. I shall assume in this example that the type decided upon is a double phaeton with front entrance (Figs. 1 and 2.) I have decided on this type because, first, the entrance being in front, only a single person (the one occupying the left front seat) is ever disturbed by entering; second, the three persons in the rear have a very comfortable seat and are seated close to each other; third, there being no door in the rear of the body, a baggage carrier may readily be affixed there.

The front seat I shall give the ordinary profile of the back seat of a tonneau, by following the lines already laid down. The rear seat, on the other hand, will be widened and raised; its height will be 24 inches; its width 50.8 inches at the seat board, which is sufficient for three occupants; its depth 22 inches.

The canopy top will be affixed permanently. In this manner a rear panel of

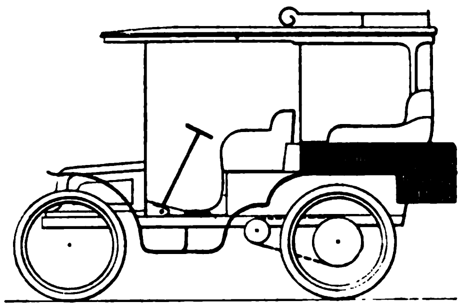


FIG. 3.

the entire height of the body may be used, without any joints. This panel will be fitted with three windows in separate frames covering its entire surface, and will extend forward a short distance on the two sides. The occupants of the rear seat can thus see in every direction and are completely protected from dust.

The canopy extends forward over the front seat, which may be further protected by means of a glass front extending up to the canopy. A second glass, similarly mounted, separates the front seat from the rear seat, if desired. Curtains of impermeable cloth or thin leather, arranged on the sides and buttoned to the edge of the body, permit in certain cases protecting the rear seat completely and the front seat sufficiently. A space for luggage is railed off on the top of the canopy and by judiciously distributing the luggage 125 to 150 pounds can be carried there. So far regarding the ensemble; now for the details.

Leaving aside the questions of painting and trimming, which are decided according to individual tastes, we would remark in passing that the use of leather for the seat cushions and backs is imperative and that a cover of impermeable cloth saves the cushions very much in wet weather and when it is extremely dusty.

We now arrive at the important question of spaces to be provided where the tourist may store away all that he needs to carry along. The front seat incloses the gasoline tank and can therefore not be figured on for this purpose. There remains the rear seat, the internal dimensions of which are approximately 34x12x20 inches, making nearly 5 cubic feet. That is little for five persons, but, of course, we have the luggage space on top of the canopy. However, in general nothing is carried there except the spare outer tubes and one or two valises at most. Consequently, as there is no more room either within or on top of the vehicle, we have to look for it on the outside. In this connection it will be noticed that below the body in the rear there is nearly always a free space. If there is no free space the manufacturer may be asked to locate his motor tank or muffler elsewhere. We may then suspend there, by means of two rods, a trunk with two doors, opening to the rear, to serve as our tool casing (Fig. 3). It will generally be 32x14x14 inches, about 3¾ cubic feet. Further, the mud guards of the rear wheels may be developed as baggage carriers (Figs. 1 and 2). To that end they are made flat and are solidly attached to the body by forged brackets; and in addition to what is done habitually, we will let them pass around the rear of the body. On this platform, which forms an inclosure round the rear seat, we may arrange baskets, hampers or valises made to order. Supposing their height to be 10 inches, we gain here a carrying volume of approximately 6 cubic feet. These various carrying spaces combined usually suffice for long trips. Nevertheless, if found necessary, we may still add (a) two square boxes stowed away under the rear end of the rear mud guards (Fig. 4); (b) a large trunk fixed by belts to a special baggage carrier hinged to the chassis and arranged like a grid to the rear of the rear seat box. In the latter case the trunk carried may be 34x12x18 inches—4½ cubic feet.

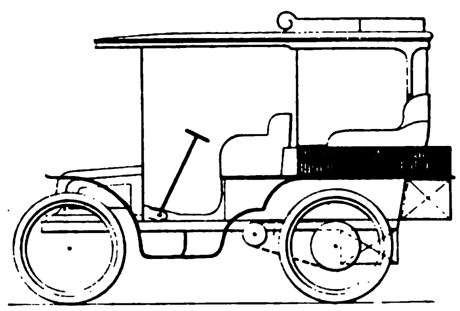


FIG. 4.

By adding up these various spaces, leaving aside what may be carried on top of the canopy, we find we have a total available space of 18 cubic feet. And figuring on a weight of 25 pounds per cubic foot, we have room for 450 pounds of tools and baggage. This is an average of 90 pounds per passenger, assuming five passengers to be carried, and is therefore more than sufficient.

In addition to the various baggage spaces here enumerated several spaces must be provided for special purposes, such as carrying road maps, springs, etc. But here again individual taste determines the arrangements, which vary for everyone. One never has too many little corners to store away the thousand little things which are the joy of the tourist. But I would always recommend to reserve each receptacle for the same class of articles, to prevent confusion and loss en route.

It is also very practical to affix to the dashboard, at some place left free by the lubricating and sparking devices, a good, strong watch and a cyclometer. The lamps must be very efficient in the case of a touring vehicle, more so than on other vehicles. Two acetylene searchlights in front serve to light up the road. Two gasoline lamps on the dashboard are carried in reserve for use in case the carbide should give out.

Trial of Tires of the A. C. G. B. I.

Following are the complete rules of the trials of tires which will be held by the Automobile Club of Great Britain and Ireland the coming fall, September 1 to September 27:

The distance will be 3,000 miles, with option of extension at the judges' discretion. About 150 miles are to be covered per day for five consecutive days in four consecutive weeks.

The route is to begin and end each day at or near the clubhouse. The cars are to be started simultaneously, and to run each day over the same route.

The cars are to be stored under club supervision.

The maximum speed is to be as in the Glasgow trial. The minimum speed in open country, an average of 12 miles per hour. In ascending hills, if the road is clear, the maximum speed is to be employed.

On each car the owner is to provide two seats, one for the official observer and one for a competitors' observer. Official observers will change cars each day in rotation.

Every competitor shall appoint an observer, who shall travel on every competing car except the one entered by the firm he represents, and may lodge complaints as to the conduct of the trial with the official observer, provided that such complaint be made on the day of the incident and in writing.

Competitors will provide the cars on which their tires are to be tried, also drivers, and will pay the cost of and will be responsible for the running of the same.

The cars must not weigh with passengers when ready for the road less than 30 cwt. They must be driven by internal combustion engines of not less than 10 brake horse power.

The maker of the car shall be entitled to a report for publication of what stops, other than tire stops, were made on the journey of 3,000 miles, their duration and cause.

If the car fails, the tires may be transferred to another car to be supplied by the competitor, provided that it complies with the conditions, and is forthcoming within two days of the failure.

The tires shall fit wheels of 910 mm. or 870 mm., or if a maker does not make these sizes the committee may accept other sizes.

The tires shall be the ordinary tires sold to the public, and shall be selected by the committee out of stock.

Six outer covers shall be selected, of which four shall be run, and two be in reserve in case of a tire being destroyed by a bad cut, etc.

The sectional diameter of the tire shall be such as the maker may consider suitable for a car weighing with load, etc., not less than 30 cwt.

At the end of the trial the tires run shall

ıe the property of the club in order ıey may be cut for examination.

ɔre the trial a section of a similar tire ɔe supplied by the maker to the com-
.

entry fee is to be £21 per set. There e no limit to the number of sets en- Any balance of receipts over ex- ure is to be returned proportion- :o competitors.

ging is to be effected by judges, the ing being factors:

mark to be deducted for every min- ent in tire inflation or repair, whether control or on the road.

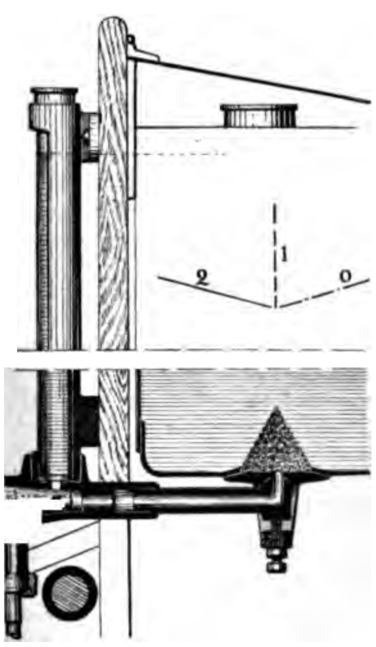
e of tires.

s of weight.

dition as shown by periodical exam- ı and by photographs taken during ial and by examination at end of

A Gasoline Tank Gauge.

cut below, from the *Automotor Jour-* presents a gasoline tank gauge and vay cock used on the Wolseley gaso- ırriages. The gauge is disposed on shboard, in full view of the driver. connected with the gasoline tank h a three-way cock, which also es- es communication with the carbure- The gauge glass shows the level of ɔline in the tank and the three posi- f the cock allow both it and the sup- the carburetor to be cut off entirely, nnection to the carburetor alone to ıblished, or the gauge glass and the etor to be connected with the sup- k. The gasoline fittings throughout een very carefully designed in order vent leakage, ground joints being ı most instances and provision being or tightening them securely.



ɛʏ Petrol Gauge and Three-way Cock.

The Counter Skid.

A device bearing the above name has recently been placed upon the English market, which is said to render side slipping absolutely impossible. It is an attachment to the back axle of the car, consisting of two hinged brackets, working on the positive and negative principles. At the bottom of each bracket there is a loose steel wheel with cutting edge, which engages, instantly and automatically, with the road surface as soon as there is any tendency toward side slipping. Severe tests conducted on greasy wood and asphalt pavements in London are said to have proved the new invention to be perfectly reliable. The device is marketed by F. Sadler, 13 Deering street, Oxford street, W., London.

Panhard & Levassor are said to have acquired the Lohmer-Porsche patents on a combination electric and gasoline system for France, England and Italy.

The French Minister of Public Works has just announced that in 1903 there will be a general census of traffic on the French national roads. Possibly automobile traffic will be classed separately.

An international exhibition with a section devoted to automobiles is to be opened at Athens on September 28 next. Several German and Italian manufacturers have promised to exhibit their vehicles.

In Italy there are at present eight automobile clubs, two having been dissolved. The clubs still in existence are located at Brescia, Ferrara, Florence, Milan, Padua, Parma, Stresa and Turin. The aggregate membership is 456.

The speed contests at Welbeck, England, have been fixed for August 9, a bank holiday. If possible a hill climbing trial on a private road near Welbeck will be held on August 8 in conjunction with the Lincolnshire and Nottinghamshire automobile clubs.

A tire manufacturer states that of 100 inner tubes received for repairs fifty-one have burst, and in thirty-two cases the bursting was due to the tube being pinched between the outer cover and the rim or between the outer cover and the retaining bolts.

A. H. Funk informs us that in the race meet of the Automobile Club de Namur-Luxembourg, Belgium, June 1 and 2, three motor bicycles fitted with the 2¼ horse power Kelecom motor won first, third and sixth prizes among a field of ten starters. The course was up hill, 8 to 9 per cent. grade, and the time made by the Kelecom was at the rate of 41 kilometres 940 metres per hour. In the second race, with flying start, among nine machines, the Kelecom came in second, third, fourth and fifth, with a speed record of 66 kilometres 960 metres, being beaten only by a motor cycle fitted with 4½ horse power.

The Touring Club of Italy has established gasoline and oil stations all over the country, 142 in all. The price for members is 10 lire per 10 litre can of gasoline, or 75 cents per gallon.

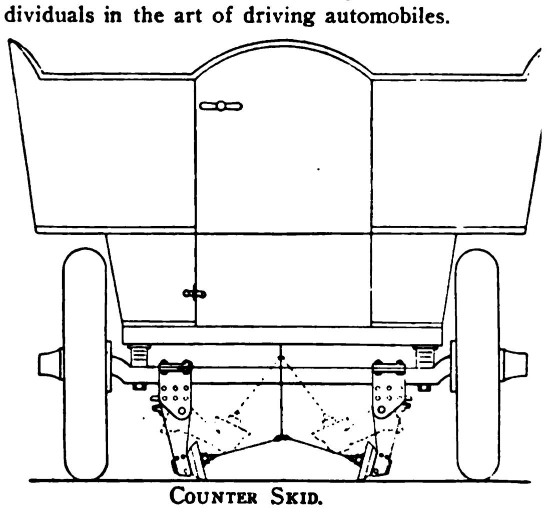
Prizes are offered to the winners in the Paris-Vienna race by the Emperor of Austria, the President of the French Republic and many other dignitaries. The tire companies offer prizes aggregating $70,000.

The electrical committee of the Automobile Club of Great Britain have decided to postpone the trials of electrical vehicles from Monday, July 7, until Monday, July 21. They will continue from Monday, the 21st, till Saturday, 26th.

For the trial of tires to be held in England in September Alfred Harmsworth has offered the following prizes: First prize, £100; second prize, £50; and £10 in respect of each set of tires not exceeding ten sets, which successfully go through the trial, a total of £250.

The Locomobile Company of Great Britain, Ltd., has been formed in London with a capital of £180,000 to transact the business of the Locomobile Company of America in and for England. The main reason for the organization of the English company is said to be to meet the sentiment in regard to profits made in England being sent over to America.

A company has recently been formed in Johannesburg for the purpose of organizing a regular service of motor cars for the conveyance of passengers and the delivery of parcels, etc., in Johannesburg and along the line of reef, and to trade as carriers and cartage contractors. They will also trade as warehousemen in storing and providing accommodation for the cars of private owners, and give instruction to private individuals in the art of driving automobiles.


Counter Skid.

Electric Vehicles of the British Electromobile Company—A Test.

Prominent among British builders of electric vehicle companies is the British Electromobile Company, of London. This company now enter into contract with customers whereby their vehicles may be housed and maintained entirely, year in and year out, for $750 a year. This price does not include cost of current, for that is such an unknown quantity that a fixed charge could not fairly be imposed. A charge of 4 cents per kilowatt hour is made for the electric energy actually consumed by the batteries, and at this rate the current used would be unlikely to cost the customer more than $150, it is claimed.

The company has a station on Juxon street, London. The cars enter the works through a gateway on the north side of the premises, the whole of the ground floor being devoted to the storage of vehicles and to repairing shops, while the galleries are set aside for work in connection with the maintenance and charging of the batteries. When a carriage comes home at any time during the day or night it is driven to a hydraulic lift, which connects the north galleries with the ground floor. Here the battery is lifted from the car and taken up to the inspection room. The driver of the incoming car hands to the foreman a slip upon which the work done by the set of cells during the day is written, and these slips are posted in the cell books, thus enabling a complete record of the life of each battery to be maintained. The vehicle, after being denuded of its battery, passes to the carriage depot to be cleaned and to have its motors and gearing examined and overhauled when necessary.

The repairing shop is in close proximity to the carriage depot, so that any repairs or renewals may be carried out with the least possible delay. Each battery is received from the car on a trolley, and on reaching the gallery is run into the inspection room, where the voltage of every cell is ascertained and recorded. From the cell log book the exact age of the set is known, and if any defect is noticeable or if the cells have done a specified amount of work they are passed on to the plate department, with instructions from the foreman of the inspection room. The plate stores adjoin the plate department and contain a large number of ready formed positive and negative plates, supplied in large quantities to the company direct from Mr. Leitner's battery works at Woking. A certain number of plates is taken from each batch and sent to the company's laboratory at Chelsea, where they are made up into cells and tested for capacity. Providing this test be satisfactory, the whole batch is passed into the store to be drawn upon as required by the plate burning department. The batteries, which are in good condition, and those which have received new plates, then pass through an archway into the south gallery, where the charging equipment is placed.

Provision is made for charging 100 complete batteries at once, the brougham type of cells being arranged down one side of the gallery and the long distance cells along the other side.

The company recently ran one of its vehicles from Kensington to Chippenham, a distance of 97 miles, on one charge, and an account of this run, from the *Autocar*, may be of interest to our readers:

"The electromobile was fitted with forty-eight of Leitner's batteries of the ordinary touring type, of 300 ampere hours' nominal capacity, and giving a pressure of 100 volts when 20 amperes were being taken from them. It will be noticed that the pressure given is a distinct advance on that given by the ordinary lead oxide accumulator, due, Mr. Leitner considers, to chemical action within the active material of the plates themselves. The road from London to Bath rises from about 50 feet above sea level at Kensington to about 650 feet on the top of the hill just before Marlborough, the rise to that point being fairly gradual, with the usual ups and downs which are so common in this country. At Marlborough the level falls to about 450 feet above the sea, rising gently to Fyfield; then with rather frequent ups and downs it rises to a little over 600 feet in the neighborhood of Beckhampton. after which it falls gradually again with the usual quantity of ups and downs, some of them, such as Black Dog Hill, being marked dangerous for cyclists, till at Chippenham the level is about 200 feet above the sea. The road is fairly good for a large portion of the way, but is rough in several parts, particularly in coming out of London. From Marlborough also on to Bath and beyond the road is paved with the white stone which is found in such large quantities all around Bath, known as Bath stone, or, more scientifically, oolite. In wet weather the road material made of this assumes the consistency which Scotchmen call "daugh" to a large extent. The material in its extreme form allows the foot or the wheel to sink into it, but refuses to allow it to come out again without considerable expenditure of energy. A large portion of the journey was undertaken in pouring rain, the rain coming on when Fyfield was reached, about 80 miles from London, so that the car had to negotiate the roads beyond Marlborough in their worst condition—that in which they make the heaviest call on the batteries. It should also be noted that the hills which occur on the route are all toward the end of the journey, when the batteries would have been doing a good deal of work, and, presumably, have been partially exhausted. An electrically driven car which is to be a practical success must be able to take all roads that are to be met with in the country in which it is used, but in considering the endurance of the batteries (which is the important point here) the facts may well be taken into account, as it means that on level road, with different road metal, the distance run with the same charge would have been very much longer. It was intended to have run to Bath, but owing to the condition of the road at Black Dog Hill and to the apparent inapplicability of the front wheel system of driving, which has hitherto been adopted on the company's electromobiles, for hilly roads in this condition, it was found necessary to complete the journey at Chippenham, 97 miles from London instead of 100. It need hardly be pointed out that for all practical purposes the 97 miles run is equal to 100. What is wanted in an automobile is that it shall be able to run day by day without being obliged to lay up for a charge, except when the driver rests.

"Some very important facts came out during the run. The current taken on the road leading out of London did not exceed an average of 20 amperes, while the current taken when ascending some of the hills was as much as 80 amperes, the battery furnishing the current without any difficulty. The total current taken from the battery was in the neighborhood of 340 ampere hours. Undulations in the road, up and down, raised the current taken to 40 amperes, short runs down not having any appreciable effect in recuperating the battery. The run of a mile down hill into Marlborough, however, produced a distinct recuperation. Current was delivered to the cells during the whole of the descent at the rate of 100 amperes, and the pressure, which had fallen to 96 volts at the commencement of the run down, rose to 100 volts when the foot of the hill was reached. On arrival at Chippenham the pressure was 93 volts, and the battery could well have furnished current for several miles more if it had been going into London in place of going from Chippenham to Bath. Leaving Chippenham on the Bath road, the level rises, at first gradually and then quickly to 500 feet above sea level, after which there is another very steep dip into Box, and then several fairly steep climbs and sharp declines. It should be noted also that a considerable amount of current must have been lost when the trouble arose with the driving on Black Dog Hill. It will be understood that the motors and accumulators were arranged for recuperation and for braking the car when descending slopes. The car is driven by two motors connected to the front wheels independently of each other. When ascending Black Dog Hill in the greasy mess which the road surface had become, owing to the wet, the wheels were unable to draw the car owing to want of adhesion, while current was being expended in whirling them round uselessly. Adhesion was obtained by one of the party sitting on the front of the car, and with some trouble the car was got to the top of the hill. Going down on the other side, the electric

brake being put on the front wheels, to which the motors are attached, the car slewed and eventually had to be run into a hedge before it could be got under control. The efficiency of the electric brake was made very evident and also of the system of recuperation when the descents were of any length. But the run also confirmed the opinion that in short runs down hill recuperation is not of much service."

The Automobile in Prussia.

The following are some extracts from an advance sheet of a report by United States Consul-General Frank H. Mason at Berlin on the automobile show which was held there recently.

THE BERLIN EXHIBITION.

The exhibition was somewhat inadequately housed in the premises of the Permanent Motor Carriage Exhibition, a series of low arched showrooms under the elevated railway viaduct on Georgen strasse. The location is central, but surrounded by narrow and crowded streets, and the rooms are so small that the open court, which is ordinarily used for showing motor carriages in motion, had to be roofed with canvas to provide sufficient space to receive the various exhibits. Nowhere during the recent competition has there been any space for testing, speeding or showing any of the machines in action, except to take them out through crowded streets to the parks or suburbs, where they remained subject to the very strict police regulations which govern the use of motor carriages in all Prussian cities. For this, among other reasons, the exposition just closed has been lacking in interest as a popular entertainment. The general public took but a languid interest in the display, and nine out of every ten persons were either owners of some kind of motor carriage or technically interested in their manufacture.

The list of exhibitors includes 105 firms, all German except two, one of which is a maker of springs and axles at Paris and the other a manufacturer of small fixtures at Budapest.

The leading German builders have made great progress in automobile construction since 1899. Not only are the carriages in general lighter, more shapely and elegant in outward finish, but they conform more closely to modern standards of construction, as typified by the leading French machines. Steam carriages formed no part of the display. Electric automobiles were there, but so few in number and so unchanged from the types of three years ago as to form only a passive feature of the exposition, in which the gasoline and alcohol motors were supreme.

Of the sixty or more vehicles on exhibition at least five-sixths were of the general type of the Mors and Panhard machines. Two makers, the Benz Motor Company, of Mannheim, and the Dietrich Company, of Niederbronn, in Alsace, still utilize their plan of power transmission from motor to driving wheels by means of a belt and pulleys.

The dominant note of this exposition has been the evidence everywhere made manifest of a general and notable improvement in many details, not only in the construction of motor carriages but in the many fixtures connected with their use for pleasure, sporting or business purposes. Three years ago few of the carriages exhibited were provided with ball bearings; now they are universal and of unsurpassed quality. The noise and vibration formerly so disagreeably incident to all hydrocarbon motors, although not yet overcome, has been greatly reduced by the inventions of the past three years. The same improvement is noticeable in pneumatic tires, in the greater lightness and beauty of wheel construction, in which slender metallic hubs with ball bearings, light but strong wooden spokes, and improved methods of fastening and removing tire mantles have been utilized.

The whole subject of electrical igniters for gas and alcohol motors has made great progress in Germany during recent years, and the exhibition included several kinds which furnish an effective and reliable spark, with a minimum consumption of current. Some of these are fed from storage batteries; in other cases the current is generated by a small dynamo carried in the automobile. Among many improved fixtures were a set of reservoirs in which gasoline can be kept with the greatest measure of safety, and the tank of a motor carriage filled by a device which registers automatically the amount of fluid taken and indicates by a dial at any moment the quantity remaining in the tank. This system is a check upon the tendency of some chauffeurs to overcharge their employers for gasoline consumed.

THE PROGRESS OF AUTOMOBILISM IN BERLIN.

It has already been stated that the general public took but a languid and incidental interest in the display. This was the result of several causes—the restricted quarters in which the show was held, the absence of races or other open air tests or exhibitions of machines, and, finally, because automobilism as a means of locomotion, sport or recreation is still in the development stage in Germany. Notwithstanding all the energy, ingenuity and enterprise of various German builders, their sales have been in many cases slow and discouraging, and the number of motor carriages in actual use for travel and sporting purposes is relatively small. The Deutscher Automobil Verband, which lent its aid to the recent exposition, comprises sixteen clubs, which have an aggregate membership of about 900 persons, and collectively include the automobile public of Germany. They are in general well organized and efficiently managed; but there has been thus far in Germany no such popular interest in automobilism as has been seen in France, England and the United States. This is apparently the result of a combination of causes, among which may be cited the very strict and rigidly enforced police regulations to which all motor carriages are subject throughout Germany, and the fact that during the past two years the independent and leisure classes of people have suffered losses through the depression of business, and have therefore been slow to invest in a luxury such as an automobile. There has never been any such surrender of the public streets, parks and country roads to motor carriages as has been seen in France, or even in Italy and Austria. Throughout Prussia the rate of speed permitted within municipal limits is limited to 12 kilometres (7.45 miles) an hour, and if this rate is exceeded there is inevitably a policeman in sight to halt the offender and bring him to justice. The result of the Paris-Berlin race of last year was to deepen and confirm the conviction of German municipalities that the automobile is an intruder to be handled with firmness and discretion.

Three years ago it was thought that the electric carriage—or perhaps a combination of gasoline and electric motors that could be made self-sustaining and independent—would be the machine of the future. Now, the electric vehicle has been practically abandoned, because it is generally heavy, costly and limited in working radius to the neighborhood of towns with electric lighting or power plants. It is therefore set aside to await the further development of the storage battery, and, as steam carriages are not yet permitted to be used on public streets in Prussia, the hydrocarbon motors now have the field to themselves. The gasoline vehicle, although greatly improved, is still more or less noisy, malodorous and subject to vibrations that constrain the intending purchaser to wait still longer before choosing a machine.

STEAM CARRIAGES IN PRUSSIA.

Under such general conditions, it was naturally thought that American steam carriages of the runabout type would find a ready and appreciative market in Germany. One of these machines, built by the Locomobile Company of America, was brought to Berlin in the winter of 1901 and attracted much favorable attention. But when the new code of automobile regulations went into effect in April, 1901, a special license became necessary, and it was found that the American locomobile collided at eight points with the Prussian law governing the construction and use of steam boilers. This statute was enacted on March 9, 1900, before the motor carriage had become a factor in transportation. It comprises forty-five sections, which prescribe with minute and elaborate precision every detail in the construction and use of steam boilers. Having been made for stationary and locomotive engines, these specifications naturally could not be adapted, unchanged, to automobiles; and, as a

consequence, the steam carriage, although licensed in Austria, Saxony and Bavaria, has been thus far practically excluded from Prussia. During the past six months, however, a movement has been organized and carried through by which the statute has been amended so as to permit the use of steam carriages which fulfill in their construction certain conditions. Under these revised conditions, the locomobile of America has been granted a concession —not yet officially issued—to be sold and used throughout Germany upon condition that three trifling modifications shall be made in its construction. One of these requires that a certain tube shall be 15 instead of 10 millimetres in caliber; the second relates to the outer shell of the boiler; and the third requires the water gauge cocks to be pierced in front so that any stoppage from dirt or boiler scale can be detected and removed. With these changes, the locomobile will be admitted to what is practically a virgin field for steam vehicles, and when converted—as it easily can be by a slight change in its gasoline burner, so as to adapt it to alcohol as a fuel—its success would seem practically assured. The whole influence of the German Government is directed toward the substitution of crude alcohol for petroleum products wherever possible, and makers of motor carriages and other machinery for this country should take that fact into account.

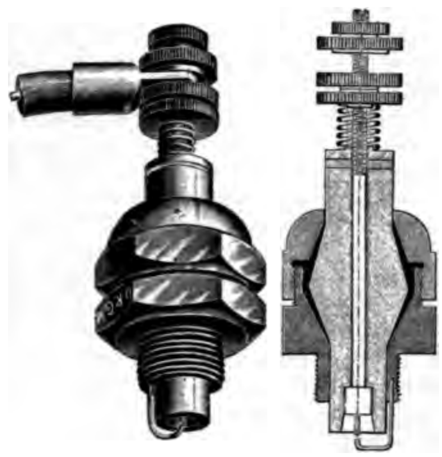
The A. C. F. has just made its annual report. The receipts of the social club (Cercle) amounted to $47,278, including a subvention of $12,000 from the Société d'Encouragement. The expenses were $43,313. The receipts of the Société d'Encouragement were $95,451 and the expenses $93,039.

The Italian Ministry of Posts and Telegraphs are about to introduce motor car services in different parts of the Peninsula. By way of beginning, a concession has just been granted to the Italian motor company L'Automobile for an experimental service of a year's duration between Ventimiglia and Viepola. The company intends working the line with eight motor 'buses of 25 horse power each, a speed of from 15 to 20 kilometres (about 9 to 12½ miles) per hour, and a carrying capacity of twenty-four passengers per vehicle.

The Association des Industriels de France, of 3 rue de Lutée, Paris, has organized a competitive trial of devices for mounting belts on fast pulleys, which shall not require the workman to come near the revolving pulley and its shaft, a proximity which often leads to serious accidents. The trial is open to engineers of all nationalities, and competitors should send in detailed descriptions of their products, accompanied, if possible, by a model, to the president of the association, at the address given above, the latest date for the receipt of these being October 1, 1902. After examining the description and and drawings, a committee of the association will select a certain number for practical trial, and will award a prize of 1,000 francs to the device which in these trials proves itself the best. Full particulars can be obtained from the directeur of the association, 3 rue de Lutée, Paris.

The "Rapid" Ignition Plug.

The ignition plug illustrated below is the product of a German firm of parts manufacturers. The plug is notable for apparently excellent insulation of the terminals and the provisions made to prevent breaking of the porcelain core by unequal expansion. The porcelain core is of double



conical shape at its middle part, the conical surfaces being surrounded by asbestos. The inner rod is held in place by means of a spring bearing against a nut secured with a lock nut. The insulating core projects a considerable distance beyond the metallic shell at the inner end.

The American Ferrofix Company, of 20 Broad street, New York, state that they have had so many appeals made to them recently to sell shop rights, county rights, and even State rights, that it has just been determined to form a new company, which shall seek to establish an agent or working plant wherever it would prove profitable, and for this purpose new plans are being made, whereby every agent will be fully instructed, either by mail or personally, in the use of Ferrofix, so that each representative shall be equipped to do all classes of brazing work. It is also the intention to protect each agent in the enjoyment of his rights in his own territory, excepting that he shall have the privilege of disposing of shop rights or interests in his agency should the field to be covered be too large for one individual to handle to the best advantage. We understand that the organization of the new company has almost been completed, and that it will be ready to begin operations within ten days or two weeks.

The Jarvis "Auto-Pet."

The Jarvis Engine and Machine Works of Lansing, Mich., are placing upon the market a safety water column for steam carriages. It is made of brass throughout, except the cover screws, and is claimed to have advantages in the line of durability. The weight complete is 6¾ pounds. The diameter of the column is 2⅝ inches and the total height 13 inches. The pipe consections are to be ¼ inch.

Sample Steel Road in New York.

The special committee of the A. C. A. appointed to secure a permit and the necessary funds to construct a sample steel road somewhere in New York city report that the funds are already in hand and that the steel has been ordered. The committee will urge Seventh avenue as the most feasible for the experiment.

Book Review.

"The Motor Car, Its Nature, Use and Management." By Sir Henry Thompson, Bart. Frederick Warne & Co., New York. Price, $1.

This little book of about a hundred pages was written by an octogenarian member of the Automobile Club of Great Britain and Ireland, undoubtedly one of the oldest devotees of automobilism in the world. The title of the book is rather too broad. The author describes only the machine he owns, a Daimler 6½ horse power, which type, moreover, is generally well known. The greater part of the book is given up to the ethical side of automobiling and a number of letters by the author are reprinted from the London *Times*, as well as correspondence which followed these letters and a leader of the *Times* on motor cars. The author, of course, employs a chauffeur and the contents of this book furnish perhaps an example of the leading thoughts that occupy the minds of those who ride in automobiles but do not drive and effect repairs. Such sub-titles as "Legal Speed," "How Rapid Drivers Are Trapped," "How to Cross-Examine," "No Speed Limit for Horses," "Certificated Drivers," "Health and the Motor," "The Best Far the Cheapest" will give an idea of the subjects dealt with. At the end of the book are given a number of itineraries for touring in England.

Charles T. Child.

We regret to record the death of Charles T. Child, late technical editor of the *Electrical Review*. Mr. Child was well known as an electrical engineer, an accomplished linguist and a versatile writer on technical subjects. His death occurred at Gleasondale, Mass., on June 23 and was due to typhoid fever. Mr. Child was born in Richmond, Va., November 1, 1867, and was therefore in his thirty-fifth year at the time of his death. He leaves a widow and three children.

BEGINNERS PAGE.

The Muffler—Governing and Controlling Means.

MUFFLERS.

At the end of the power stroke the pressure in the cylinder is still from 40 to 50 pounds gauge pressure per square inch. If the spent gases or products of combustion are discharged directly into the atmosphere a deafening noise is produced, not unlike that accompanying the discharge of a gun. This noise is due to the sudden liberation and expansion of the confined gases, and to avoid it the gases must be caused to expand gradually by discharging them through a resistance-offering passage with facilities for gradual expansion, called a muffler.

A muffler, then, must offer some resistance to the passage of the exhaust gases to be effective. It does not follow, however, that the more resistance it offers the more effective it is in reducing the noise. Since any resistance to the discharge of the exhaust gases must necessarily reduce the power of the engine it is important that the resistance (or the back pressure) of the muffler be the least possible consistent with efficient muffling.

Three different designs of mufflers are shown in Figs. 1, 2 and 3. In the muffler of Fig. 1 the exhaust gases are led through the exhaust pipe into a cylindrical chamber formed of cast iron end plates and a sheet iron tube. The exhaust pipe screws centrally into one of the end plates. Centrally into the other end plate are screwed two lengths of pipe, one extending inwardly and the other outwardly. The former has its end closed by a cap and is drilled with a large number of small holes along its length.

FIG. 1.

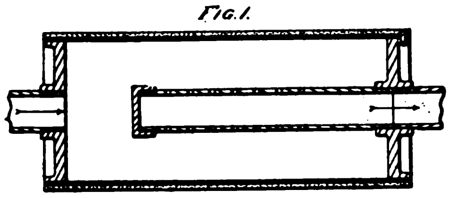


FIG. 2.

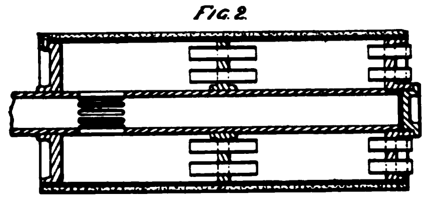
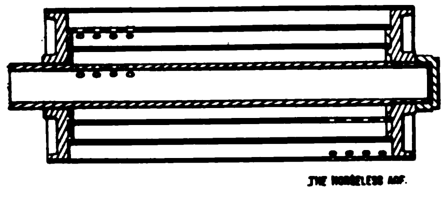


FIG. 3.



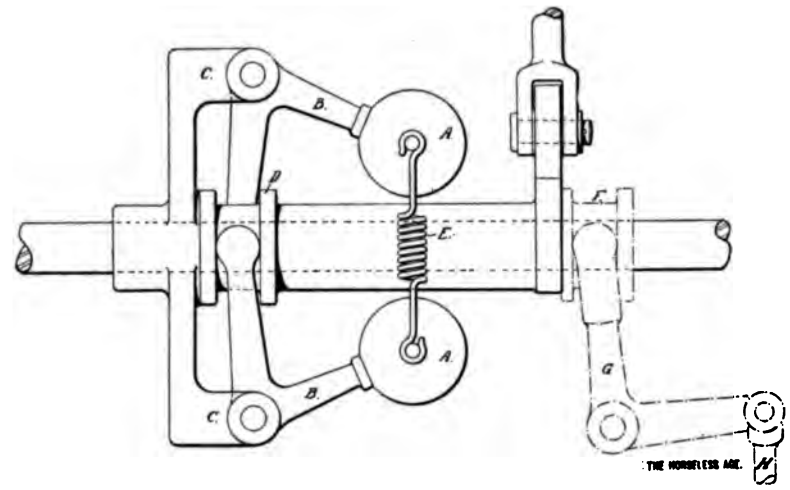


FIG. 4.

The muffler of Fig. 2 also consists of a sheet iron tube and cast iron headers. The cylindrical space is divided into two parts by a dividing wall of iron and these spaces communicate with each other by means of metal tubes extending through the dividing wall. The pipe through which the exhaust gases arrive is provided with a number of saw slots. The gases pass through these slots into the first half of the cylindrical chamber and expand; then they pass through the small tubes of the dividing wall into the second half of the cylindrical chamber, where they expand further. Then they pass out to the atmosphere through small tubes in the header plate at that end.

A third design of muffler is shown in Fig. 3. It consists of a number of concentric tubes of sheet metal with common header plates. The gases are led into the inner tube at one end and pass into the successive concentric spaces through small perforations in the tubes. The perforations are arranged at opposite ends and sides in successive tubes.

Owing to faulty ignition explosions will sometimes occur in the muffler, and the latter must therefore be made strong enough to withstand these explosions. Very frequently the muffler is lagged with asbestos to prevent the outside of it getting very hot and thus prevent working around it when the engine is running or has just been stopped. The asbestos may also help to reduce the noise. Preferably the asbestos is covered by a layer of thin sheet iron.

GOVERNORS.

Ordinarily when the load is taken off the engine its speed will increase and the engine will race. To prevent this a governor is sometimes employed. A governor is an automatic device for keeping the speed of the engine within a certain limit. There are two general types of governors, hit-and-miss governors and throttle governors. The former act by preventing charges from being drawn into the cylinder for a certain proportion of the cycles the engine runs through and the latter by reducing the charge per cycle. In both cases a centrifugal governing device is used, mounted either on the crank shaft or on the half-speed shaft.

To prevent a charge being drawn into the cylinder the exhaust valve is not lifted during one exhaust stroke. This end is attained either by withdrawing an intermediate piece between the push rod and the exhaust valve stem so that when the push rod is lifted it does not strike the valve stem, or by shifting the exhaust valve cam in the direction of its axis so it comes out of line with the cam roller. The latter method is illustrated in Fig. 4.

A typical centrifugal governor is shown in Fig. 4. A A are the governor balls, mounted on bell cranks B B. The latter are pivoted to arms C C extending from the cam shaft and rotating with it. The free arms of the bell cranks are in engagement with a grooved collar D on the cam shaft. The grooved collar may be formed in one piece with the exhaust valve cam and the whole be mounted to slide freely along the shaft on a feather key. Two coiled springs E keep the balls close to the shaft when the engine is running slowly. When the engine's speed exceeds that for which the governor is set the balls fly outward from the shaft under the action of the centrifugal force. The bell cranks then move the grooved collar and the cam along the shaft; the cam is moved out of line with the cam roller and the lifting of the exhaust valve is prevented.

This at once reduces the speed of the engine; the centrifugal force on the balls becomes less, and they are moved toward the shaft again by the springs E; the exhaust cam is again brought in line with the cam roller and the exhaust valve is lifted as before.

With a throttle governor the arrangement is exactly the same, only that in place of the cam we have another grooved collar F on the shaft (shown in dotted line) connected with the grooved collar D. With this grooved collar engages a bell crank G, pivoted to a stationary part of the engine. The other arm of this bell crank connects by a rod H to the throttle

valve lever, and the arrangement is such that when the governor balls fly outwardly the throttle valve in the intake pipe partly closes, while when the motor is running at or below its normal speed the throttle is fully open.

An engine provided with a governor will therefore run at a constant speed as long as the load is light, and drop below that speed when the load becomes relatively large. Sometimes it is found desirable to run the engine faster than the governor permits it to run, and that this may be done a device is fitted called an accelerator, which annuls the effect of the governor. The principle of the accelerator action is that it adds to the counter force which holds the governor balls close to the shaft so that a higher rotative speed is required to separate them and throw the governor in action. The arrangement is usually such that a second spring is brought into play which adds to the effect of the regular springs. This extra spring is controlled by means of a handle located convenient to the operator.

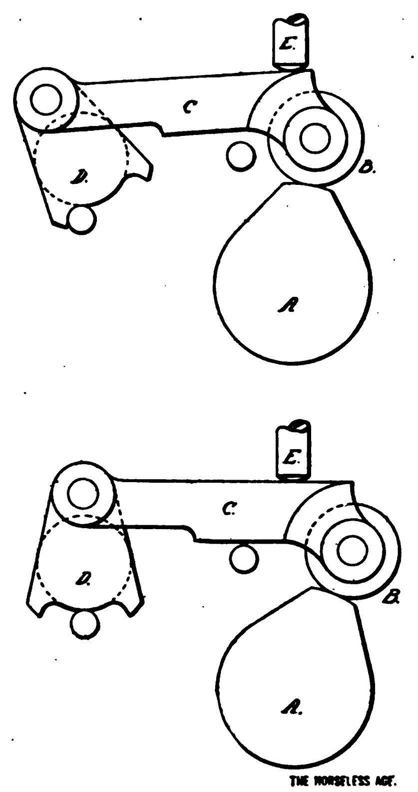
MANUAL SPEED CONTROL.

When the engine receives a full charge at every cycle and this charge is ignited at the most favorable point, the power obtained is a maximum. To reduce the power (and hence the speed) of the motor we may either reduce the charge admitted per cycle or cause the ignition to occur late, or both. To reduce the charge per cycle is the most economical method.

The charge introduced into the cylinder per cycle may be reduced by partly closing a throttle valve in the admission pipe or by lessening the lift of the exhaust valve. The former method reduces the charge directly by throttling, as will be apparent without further explanation; and by reducing the exhaust valve lift a considerable quantity of burned gases is kept in the cylinder, so that less charge is sucked in during the next intake stroke. A variable exhaust valve mechanism is shown in Fig. 5. The upper drawing shows the device in the position of maximum lift and the lower in the position of partial lift. A is the exhaust cam, B the cam roller, C an exhaust lever which is pivoted to a crank D, and E the exhaust valve stem. The crank D can be partially rotated by means of a handle located convenient to the operator and the lift of the exhaust valve thus reduced at will.

The various parts the operation of which affects the speed and power of the engine may thus be arranged, as follows:

The intake valve may have a constant or hand controlled, variable limit of opening. A throttle valve may be placed in the intake passage to be controlled either by hand or by a governor. The exhaust valve may be operated intermittently by means of a governor. The exhaust valve lift may be constant or variable and hand controlled. The igniter may be invariable as regards time of ignition or variable either by hand or governor.



The Paris-Vienna Race.

The start in the Paris-Vienna race took place at Champigny, 12 miles outside Paris, at 3:30 a. m. on June 26. Girardot, Fournier, Edge and de Knyff were the first four to start. Foxhall Keene (Mors) left at 3:45 and W. K. Vanderbilt (Mercedes) at 5:43. The number of starters was 137 and an enormous crowd witnessed the start.

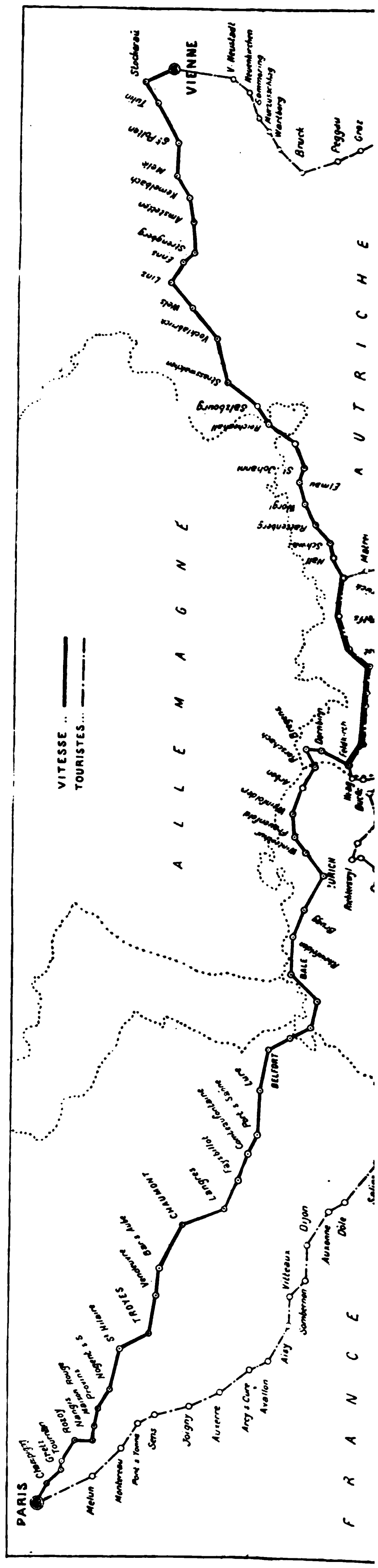
According to telegraphic reports there was a serious accident at Louvres, in which one person was killed and another one seriously injured. Their machine was overturned. They were not contestants, it is reported.

Foxhall Keene met with an accident to his machine at Belle Croix, but he was not injured. It is stated that he ran into the barrier of a railroad crossing. Near Gretz-Armainvillers, 24 miles from Paris, C. S. Rolls punctured a tire and lost control of the automobile. The car knocked down a tree and dashed into a ditch. Rolls and the chauffeur were thrown to the ground. Neither was seriously injured.

While escaping a grade crossing Gabriel collided with a barrier and damaged the car. He had to abandon the race.

Fournier's machine collapsed at Chaumont, 11 miles out, while he was in the lead. The tire of W. K. Vanderbilt's car burst beyond Tournan. Vanderbilt jumped out of the car and set to work repairing the damage. When he had completed this work he raced away again, and reached Chaumont at 1:52 a. m.

René de Knyff was first at Belfort, the



end of the first day's race, arriving at 10:47 a. m. The distance is 408 kilometres (255 miles). His net time was 4h. 6m., indicating an average speed of 100 kilometres (62½ miles) per hour.

The first six machines were Panhards. Then followed Count Zborowski in a Mercedes, de Crawhez in a Panhard, Giraud in a Charron, Girardot and Voigt, Decaters in a Mors and Edge in a Napier. Girardot was also put hors de combat by an accident. Vanderbilt arrived at Belfort at 4:21 p. m., being the fifty-fifth to arrive.

The winner for this stage in the light automobile category was M. Edmond, with a Darracq machine, his net time being 4h. 47m. M. Oury won in the voiturette category with a Renault in 6h. 19m.

Of the 137 starters from Paris 106 arrived at Belfort and 105 started on the second stage on the 27th.

The first four starters from Paris—Girardot, Fournier, Edge and de Knyff—competed for the Gordon-Bennett cup, the race for which was run in conjunction with the Paris-Vienna race and was to be from Paris to Innsbruck, a distance of approximately 500 miles, plus neutralized territory. At Belfort the first two were out already and only the last two—Edge and de Knyff—remained to compete for the cup.

The Swiss authorities had refused to sanction racing on their territory, and on the second day the racers therefore proceeded at a moderated gait from Belfort to Bregenz in Austria on the Swiss frontier.

On Saturday the third stage, Bregenz to Salzburg, was run. De Knyff was far ahead of all other competitors when 25 miles before Innsbruck his machine broke down and he had to quit. Edge was therefore the only one to finish in the International or Gordon-Bennett cup race, and he is regarded as the winner. His actual time from Paris to Belfort and from Bregenz to Innsbruck was 10h. 41m. 58s. It is asserted that Edge will be disqualified on account of having received help from some peasants in extricating his machine from a bad place on the road. Edge, on his part, says that when his machine fell into a ditch a number of peasants ran to assist him in getting it out, but he drove them away and got the car out himself. He protested against being disqualified.

Baron de Forest (Mercedes) was the first to reach Salzburg, at 1:34 p. m., his average speed up to that point having been 44½ miles. Henry Farman arrived second, at 2:18, and he was said to be the winner up to that point.

Many automobiles were damaged, owing to the poor condition of the roads. A number of accidents occurred in crossing the Arlberg. One of the competing vehicles is said to have run off a bridge and dropped into the River Sena, 300 (?) feet below, being smashed to pieces. The occupants escaped with slight injury.

The race came to an end on Sunday at the Vienna trotting track. It was an unusually hot day, but an immense crowd of people had gathered on the grand stands and promenades. The first to arrive was Marcel Renault (Renault, light carriage class), and, as is usual on such occasions, he was received with vociferous applause. It is possible that he may be disqualified, as he failed to have his pass signed at the last controlling station. He states that the omission was unintentional.

The second to arrive, and the first in the heavy vehicle class, was Count Zborowski (Mercedes), who presumed that he was the winner. He was followed after a considerable time by Maurice Farman (Panhard). Zborowski accounted for his good showing partly by the fact that he had never had to renew his water supply.

The actual running time of Marcel Renault was 15 hours 22 minutes, which gives him an average speed of 82 kilometres (51 miles) per hour. After Farman came Baras (fourth), Edmond (fifth) and Hemery (sixth).

At the time of going to press the winner is not known. The credit of being winner in the Paris-Vienna race is claimed by Renault, Zborowski and Farman, and that of winning the Gordon Bennett cup race by Edge. Protests have been filed against Edge and Renault, however.

In the evening a banquet was held, which was attended by the French ambassador, the president of the Austrian Automobile Club and others.

THE TOURISTS' EXCURSION.

From a correspondent in Paris we learn the following about the start of the tourists' section on June 19:

About a thousand curious had congregated on the Place de la Concorde on June 19 about 8 a. m. to see the start of the tourists' section. The vehicles emerged from the sheds of the Automobile Club one by one, and as they passed out they were snapped by photographers who were present in large numbers. The machines, which were decorated at the rear with miniature French and Austrian flags, proceeded to be officially stamped and sealed.

The stamping and sealing having been accomplished, the chauffeurs donned their leather coats, covered their eyes with protecting goggles and started off. They cut diagonally across the place and on the river bank took the direction of Villeneuve-Saint-Georges, the first control. Among the participants were a number of "chauffeuses."

Toward 10 o'clock a. m. the last of the fifty or more vehicles started. At this time President Loubet, who returned from his morning ride on the Grandes Boulevards, made a halt in front of the Automobile Club's premises and examined the two or three vehicles which still awaited being stamped and sealed.

From Melun, the second control, it was reported that thirty-seven vehicles had passed, in the best condition.

At Auxerre, the end of the first stage, nineteen vehicles had arrived by 6:17 p. m. Some others were still awaited.

MINOR MENTION

Terwilliger Brothers, Amsterdam, N. Y., are planning a stock company to manufacture a steam automobile of their construction.

The Springfield (Mass.) Automobile Company has opened a branch at North Adams, same State, in the Richmond Theatre Building.

The Steam Vehicle Company of America, who have been petitioned in bankruptcy in Philadelphia, state that they are perfectly solvent and will pay every dollar they owe.

Street Cleaning Commissioner Woodbury, of New York city, has so far been unsuccessful in obtaining a satisfactory garbage motor vehicle. He is still looking for the right article.

The Klinger gauge glass mentioned by one of our correspondents last month as a solution of this kind of difficulty is now offered for sale by the Locke Regulator Company, Salem, Mass.

Frank Osmun, an eight year old boy living in Jersey City, had his right leg broken last week while trying to steal a ride on an automobile. His clothing became entangled in the machinery and he would probably have been killed had not the driver's attention been called to the situation.

The Diamond Automobile Company, capital $125,000, was organized last week at Wilmington, Del. James Bailey was elected president and Joseph H. Bailey, Jr., secretary and treasurer. The shop of the company will be the Calvin I. Swayne Building, Orange street, above Eighth. Martin Minogue, of Springfield, Ohio, will be in charge of the plant.

The Ohio Automobile Company, Warren, Ohio, has plans drawn for another factory building 200x60 feet and two stories high, to be located just east of its present shops. This will practically double the output of the plant. A new foundry may also be included in the improvements. From July 1 they expect to ship on two or three weeks' notice.

The American Motor Company has been organized to introduce automobiles for livery purposes in Chicago. The autos accommodate from two to twenty passengers, and a licensed chauffeur will attend to the driving, although a city license will enable one to lease a machine without the chauffeur. The schedule of charges will be little more than present carriage rates.

A report was in circulation last week to the effect that Charles M. Schwab, the Steel Trust president, a member of the Automobile Club of America, had tendered his resignation because of an admonition from the board of governors on his well advertised speed excesses as an

automobilist. Whether the rumor was true or not could not be verified at going to press.

E. B. Finch & Co., Detroit, Mich., have introduced an auto 'bus for hotel service.

Fred Jones, a liveryman of Elmira, N. Y., is introducing electric vehicles in his business.

The automobile dealers of Kansas City, Mo., are talking of a local 100-mile endurance run in order to stir up business.

Frank Betz & Co., Somerdale, Ill., 20 miles from Chicago, are about to engage in the manufacture of automobiles.

The Towanda (Pa.) Motor Vehicle Company has been organized to manufacture electric vehicles after designs and patents of Charles A. Lindstrom, of Buffalo, N. Y.

A reader in Los Angeles, Cal., writes: "I think that for its size we have more automobiles in this city than in any place I have been in, except Paris. Our roads are good all the year around, and this is a good field."

The Nungesser Electric Battery Company, 27 King street, Cleveland, Ohio, have placed on the market a new battery for sparking gas engines, known as the Acme No. 16, and a new spark coil, 6x2¾ inches, for igniting high speed gasoline engines.

The Consolidated Rapid Transit Company has been organized at Guthrie, O. T., with $100,000 capital stock, to operate a line of automobiles between Guthrie and other cities of the territory. The directors are Browne Cornelison, M. Vandervoort and John D. DeBois.

Van H. Cartmell, formerly secretary and vice-president of the Consolidated Rubber Tire Company, has been chosen president, to succeed Isaac L. Rice. Mr. Cartmell has been in the rubber tire business since 1894 and is both experienced in his special line and an able executive.

The Automobile Club of Pittsfield, Mass., has elected new officers, to wit: Dr. Frank W. Brandon, president; Samuel Colt, vice-president; L. A. Merchant, secretary and treasurer. The club will soon build a fine station and club house. About thirty members have already been enrolled.

The Mobile Transportation Company of New Jersey, capital $100,000, has been incorporated by W. Stuart Dilks and F. Sherwin, of Mullica Hill; John A. Crawford, of New Brunswick; Irving Turner and John Harris, of Camden, to operate a line of automobiles for passengers between Wenonah, Mullica Hill, Clayton and Woodbury. It is the intention to extend the line throughout Gloucester County, with the possibility of Salem and Cumberland counties being included in the near future. The company hopes to have the automobiles in operation in less than two weeks, and will make eight round trips a day. The proposed route is from Woodbury to Wenonah, to Clayton, to Pitman Grove, and to Mullica Hill and return over the same route. The machines will have a capacity of from twenty to thirty passengers.

The Superior Motor Carriage Company has been organized at Cleveland, Ohio, to manufacture automobiles.

It is reported that an automobile line will connect Kankakee, Ill., with its manufacturing suburb on the west.

The license clerk of Cleveland, Ohio, had issued 273 licenses up to June 23—137 gasoline, 91 steam and 45 electric.

A company has been formed to operate an auto service at Spokane, Wash., in opposition to the street railway system.

The Pittsburg Automobile Company opened their new emporium on Centre avenue, near Beatty street, last Saturday.

The Porter Battery Company, Waukegan, Ill., is reported closed by an injunction from the Electric Storage Battery Company, of Philadelphia.

Alexander Winton is reported to have broken Fournier's mile record on the Clifton Boulevard, Cleveland, Ohio, last Thursday, making the mile in 51 1-5 seconds, against Fournier's 51 3-5.

The International Automobile and Vehicle Tire Company have purchased the plant of the Meyer Rubber Company, Milltown, N. J., and expect to be installed there and in good running order by August 1. The Meyer plant is one of the largest in its line in the country.

The Automobile Club of San Jose, Cal., has been organized by the election of E. T. Sterling, president; B. D. Merchant, secretary, and an executive committee, consisting of Frank Coykendall, Harry Bercovich, Charles Chrisman, E. T. Sterling and B. D. Merchant. About forty-five charter members are expected.

An automobile, said to be the property of Spencer Trask, a New York banker, and operated by his chauffeur, ran down and injured a woman at Fifty-ninth street and Sixth avenue, New York city, last Thursday. An enraged crowd gathered, threatening violence to the chauffeur, but trouble was averted by bystanders. The chauffeur was not arrested.

The Cleveland Automobile Club has named the following committees for the year: Executive and legislative—E. L. Strong, Windsor T. White, W. S. Root, George L. Weiss, C. B. Shanks. Membership—W. C. Shires, Britton T. Day, J. G. Moore, W. M. Wright, O. S. Southworth. Auditing—E. L. Strong, C. B. Shanks, George Collister. Runs and tours—C. B. Shanks, Windsor T. White, George Collister.

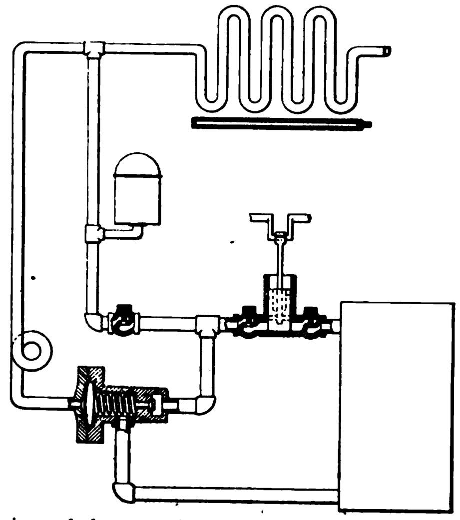
The Wisconsin Fidelity Trust and Safe Deposit Company, receivers of the Milwaukee Automobile Company, have been ordered by the court to sell all the property of the bankrupt concern on July 8, 1902, at 10 o'clock a. m., at the Milwaukee company's factory, St. Paul avenue, foot of Nineteenth street. Machinery, unfinished materials and the uncollected book accounts will go under the hammer.

MOTOR VEHICLE PATENTS..

United States Patents.

703,220. Feeding Mechanism for Boilers.—Rollin H. White, of Cleveland, Ohio. June 24, 1902. Filed January 3, 1900.

The White automatic feeding mechanism for flash boilers. The invention consists of the combination of pumping mechanism, a feed pipe leading therefrom, a by-pass from the pumping mechanism and a valve normally closing such by-pass, but adapted to be opened by the pressure generated in the boiler when the same reaches a predetermined amount. An air chamber is connected with the main feed pipe, and by the compression of the air therein not only continuously regulates the flow but also starts it instantaneously when the operation begins and before sufficient steam is generated to operate the pump.



The automatic by-pass valve is of the general type of automatic pressure valves, only that it opens under the pressure instead of closing.

702,930. Changeable Speed and Reversing Gear.—Thomas A. Dicks, of Wilkinsburg, Pa., June 21, 1902. Filed September 25, 1901.

On the driving shaft are mounted an internal and an external gear, the former being loose and the latter tight on the shaft. A number of sets of gear pinions of different diameters are arranged to be slid into operative relation with the internal and external gear.

703,157. Starting Mechanism for Gas Engines.—Frank A. L. Snecker, Coscob, Conn. June 24, 1902. Filed March 7, 1901.

703,185. Roadway for Motor Vehicles.—Alexander Clark, Evanston, Ill. June 24, 1902. Filed January 20, 1902.

703,186. Vehicle.—Alexander Clark, Chicago, Ill. June 24, 1902. Filed February 17, 1902.

703,337. Car Mover.—James W. Dear, Dayton, Ohio. June 24, 1902. Filed March 15, 1902.

THE HORSELESS AGE

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The Proposed Chicago-New York Endurance Contest.

Rumors have been persistent in the daily press for some time that an endurance contest was to be organized between Chicago and New York city, and a recent report states that the Chicago Automobile Club has appointed a special committee to take preliminary steps toward promoting such an affair, and that the committee has been instructed to consider the matter with the National Association of Automobile Manufacturers and the Automobile Club of America.

Granting, then, that the matter is considered seriously by a prominent club, it behooves us to investigate the merits of the proposition. Two questions arise in this connection, viz., the need of another long distance endurance contest, and whether New York-Chicago is the most suitable route.

It must be remembered that a contest comprising a run from New York to Boston and back has been on the tapis for a long time. The route selected for this contest is, we believe, as satisfactory as any that could be found. It was the general impression after last year's long distance contest that it was too difficult for the average vehicle, and that it imposed too many hardships on the drivers. The conditions would be rendered even more severe by the restriction of repairs and outside help, which will undoubtedly characterize all future contests of this kind. The route New York-Boston and return will satisfy the requirement of a somewhat easier trial, while at the same time it will lead through a part of the country in which automobilism finds its greatest stronghold, and will therefore serve best as a means of publicity.

No doubt, therefore, the majority of manufacturers will patronize this contest. Now we do not believe that after competing in this contest manufacturers would be willing to enter another severer one within so short a period of time. Contests, like shows, must not be overdone.

Regarding the practicability of a Chicago-New York endurance run at some future period—say, next year—for the average light vehicle it would undoubtedly be too severe a test, and should not be encouraged. But a heavy touring car should be fully equal to the task, at a moderate speed, of course. The basis for awards should be the time lost in repairs, and speed over a minimum of 8 miles an hour should not affect the official record of a vehicle.

There is no doubt that in the future contests will have to be organized for special classes of vehicles. It is not practical to subject touring cars, runabouts, goods vehicles and electric carriages all to the same test. The average 100 mile contest is comparatively easy for a heavy touring car, while for electric vehicles the conditions have as yet always been too severe, chiefly owing to the inclusion of steep hills in the itinerary, which increase the current consumption enormously. And commercial vehicles are not entered in such contests, either because no special classes are provided for them or because among a lot of pleasure vehicles a few commercial vehicles would be lost sight of by the public. It is true that the proper organization of a contest involves a great deal of trouble, and that with a large number of entries more perfect arrangements may be expected. But contests organized to suit the conditions of certain classes of vehicles will surely give better results, and rather than duplicate the same kind of contests indefinitely it would be advisable in the future to specialize.

Insurance Against Damage Suits.

In Chicago a concern has entered the business of insuring owners of automobiles, guaranteeing to fight all damage suits brought against the holder of the policy within the period for which it is issued. The policy covers damage suits on account of accidents, to any person or persons, claimed to have been caused through the negligence of the insured or his chauffeur.

The proposition has been discussed to some extent by Chicago automobilists and is regarded favorably by some and denounced by others. Those who think favorably of it maintain that it will check wanton persecution of automobilists. Au-

tomobile owners are generally thought to be wealthy and there are always some unscrupulous persons who regard them as legitimate prey. Claims may be brought against automobilists in cases of accidents for which they were not in the least to blame and it is to protect them against the annoyance of such claims that accident insurance might prove a desirable institution.

The arguments of the opponents of this insurance scheme also contain a good deal of logic. One of these opponents claims that it would necessarily make a driver less cautious and that caution is the best safeguard the driver of an automobile can have. Moreover, insurance might give the driver a false sense of security. In case of a serious accident a charge of criminal carelessness might be brought and the fact that the driver was insured would be a strong point with the lawyers for the prosecution. It would be likely, also, to prejudice the jury against the defendant.

The gentleman referred to even urges that the city licensing bureau should not issue licenses to the holders of such insurance policies.

It has frequently been claimed that a regular business is made of bringing damage suits against street railway and other corporations. However that may be, it cannot be said that automobilists have yet been annoyed to any extent by unjustified prosecution. It is necessary at the present time that all operators of automobiles should constantly be possessed of a sense of responsibility, which will save them trouble and annoyance individually, and protect the interests of users as a whole and of the industry at large. This damage claim insurance scheme is therefore not to be encouraged.

A Heavy Vehicle Contest Needed.

Now that a number of firms in the United States are actually delivering motor trucks to purchasers and others are about to enter this business, it would seem opportune to organize a contest specially for such vehicles, to make the public acquainted with their adaptability to practical work. The lead which English manufacturers have obtained in this branch of motor construction is largely the result of the contests which were held in 1898, 1899 and 1901 by the Liverpool Self Propelled Traffic Association, a branch of the Automobile Club of Great Britain and Ireland. The field for motor trucks is certainly as good here as in Great Britain and that progress in the construction of such vehicles has so far been comparatively slow here is due, on the one hand, to the fact that the manufacture of pleasure automobiles offered greater opportunities, especially to firms with small capital; and, on the other, to the fact that the manufacture of motor trucks has received no encouragement here.

At present there are in this country three firms actually delivering steam trucks. A fourth firm, intending to place a successful English design of motor truck upon the market here, is getting ready for business, while another English manufacturer of such trucks is trying to dispose of his United States patents. A fair list of entries could therefore undoubtedly be obtained of steam trucks only. However, a contest organized for heavy vehicles might well be made to include vehicles of all motive powers carrying loads from 1,000 pounds up, in which case quite a few entries might also be expected from manufacturers of gasoline and electric delivery wagons. Vehicles should, of course, be divided into classes according to the load carried, and in this respect the rules of the Liverpool trials would be of much help in organizing a contest.

Many large business houses have been much interested in motor trucking and delivery, but to judge from correspondence received at this office, they are generally at sea regarding the practical status of the motor wagon for heavy loads and the industry of its manufacture. A practical contest would do much to clear the air, especially if the organizers published a comprehensive account of the trials, together with descriptions of the vehicles, as was done by the Automobile Club of Great Britain.

Here is an opportunity for a representative automobile club really anxious to aid the automobile industry. A contest late in the fall or next spring would serve the purpose well.

Leaky Tanks.

Gasoline tanks of both gasoline and steam carriages should be made with the greatest possible care to prevent the possibility of leaks. They should preferably be located a considerable distance from the engine, so that if a leak does occur the gasoline will run directly onto the ground. carriages, where the fuel supply is kept under air pressure, this requirement is generally recognized; but it is just as important in gasoline carriages. Leaky gasoline tanks have been the cause of scores of accidents, and a particularly serious one ascribed to this cause occurred in the West a short time ago. The owner of a large machine (characterized in the report by its price, as has become the custom with the newspapers) was out driving in it when it came to a sudden stop. Upon alighting the occupants found that the tank had sprung a leak and the gasoline was being spilled over the vehicle, and almost immediately the vehicle burst into flames and the inflammable parts were completely consumed.

The details are too meagre to base any definite conclusions on. The question in a case like this always is, What ignited the spilled gasoline? Of course, when a vehicle is standing and the contents of the fuel tank are spilled over its parts the surrounding air will easily become charged with vapor to such a degree as to form an explosive mixture. Some details of the report suggest that the vehicle may have been of foreign manufacture and provided with hot tube ignition, in which case the ignition of the spilled gasoline and the vehicle may have been caused by the vapor reaching the igniter burners and being ignited by them.

Heavy copper tanks with seamless shells and riveted and soldered heads are strongly to be recommended for this purpose. The piping for the gasoline should be made short and with few joints, and the joints must be absolutely secured against rattling loose.

"Hasten Slowly."

At the present time, when the large masses of the general public are still ignorant of the possibilities and limitations of automobile traffic, it should be the endeavor of the manufacturers to prevent as far as possible the use of their machines for impractical purposes. All such applications are, of course, sure to result in failure and to retard the progress of the rational use of motor vehicles by biasing the public against them. It has so far been impossible for the manufacturers to satisfy the demand in fields in which the automobile has proved a success, and no reason exists why such extremely questionable (from a commercial standpoint) applications as 'bus and stage service in mountainous districts should be consid-

ered at all at present. However, through the agency of local promoters this field has been exploited to some extent for nearly a year and failures of such ill-advised speculations are now frequently reported. The latest failure occurred at Ferris, Cal. A machine which had been bought for the Idyllwild stage line in that vicinity was shipped back to Los Angeles, having proved unequal to the work required of it on the mountain grades.

We have repeatedly referred to the inherent difficulties connected with the problem of motor vehicles for strictly business purposes, and hold that no one should launch out in this line until his system has proved a success in pleasure vehicles, or at least until extensive experiments with the model machine have proved it to be practical for the work. In this line of work it is advisable to "hasten slowly," for a long series of failures in the application of automobiles to business purposes is bound to retard the progress of such vehicles greatly.

Competitive Trials of Parts.

By Albert L. Clough.

We have had all kinds of "endurance tests" from 100 mile boulevard spins on Long Island to a 500 mile test, which really "tested" through the villainous roads of New York State in the midst of a rainy spell. These events have done much to demonstrate the relative qualities of endurance possessed by the various machines entered, and their results have doubtless influenced hundreds of purchasers of automobiles. But thus far we have had no competitive tests of the various parts or auxiliaries of motor vehicles, which are offered in the open market in great variety and every one of which is claimed to be the best. I refer to batteries, coils, spark plugs, sparking generators, mechanical lubricators, mufflers, radiators, lock nuts, lamps and, above all, tires.

All these devices are such as automobile owners are buying from time to time, either as additions to their carriages or as renewals, and it would be of the greatest advantage to the business if tests of these accessories could be conducted by some unbiased organization to give the intending purchaser some idea of their actual qualities. For instance, take the matter of spark plugs. The spark plug is a small and unobtrusive member of the aggregation of parts which go to make up an automobile, but if the plug declines to do its duty the whole show has to be declared off. The plug resides in a very hot place and is subjected to a terrific voltage, with occasional douches of mud, water and oil, and perhaps does as well as could be expected, but why wouldn't it be a good idea for the spark plugs to have a little endurance contest all by themselves, so that we might know something about their relative durability and power to resist heat, high tension current and moisture of the different styles. A person puts in a new spark plug with the feeling that it may last a day or it may successfully outlive the season. It is always under suspicion, and is the most unsatisfactory part of an automobile today, always excepting the tires.

And batteries. They can't all be the best. and there isn't a man who drives a motor car who is not praying for more light on the subject. No reason is apparent why the batteries shouldn't have an endurance test, under the direction of competent electrical engineers, the results of which would prove a boon to every user who is now wildly experimenting on his own responsibility. If one has to renew a coil or a driving chain there is absolutely no data to guide him except the manufacturers' claims, and yet the former device is perfectly capable of being tested competitively as to strength of insulation, character of spark and current economy, and the latter in regard to wearing qualities, tensile strength, transmission efficiency and repairability. When one mentions tires there is no need of urging reasons for a test. In fact in England, where they are far ahead of us in their methods of stimulating and directing new arts, a test of tires is already arranged for. What is the reason that we cannot have one in this country?

Abroad, it seems to be a common custom to offer prizes for the best device of a certain class. For instance, prizes have been offered in Germany for the best alcohol carburetor, and the result has been a great development of these devices and a notable advance in the art. Here, everything seems to be left to the initiative of the manufacturer, who is obviously more swayed by motives of self interest than by any considerations bearing upon the good of the art as a whole. It would seem that prize competitions must be as fruitful of good in this country as they have been found to be abroad.

Here is an example of a line in which the offer of a prize would be stimulative: A system of carburation with kerosene. Almost everyone is aware that the time is not far off when the supply of light hydrocarbons will prove so inadequate to meet the increased demand that the price will be prohibitively increased. Then the users of hydrocarbon motors will be driven to the use of heavier petroleum products. The manufacturers of steam carriages appear to see this plainly as well as to appreciate the superior present economic advantages of kerosene, and are bringing out kerosene burners, which will doubtless soon be brought to a state of thorough utility. The manufacturers of gasoline carriages seem to be much slower in taking a similar action, probably on account of the superior gasoline economy of their vehicles, but the necessity of action is simply a little more remote in their case.

If prize competitions, such as have been held abroad, were to be inaugurated in this country under proper auspices, the objects of which were to be the development of the art of carburation by means of the heavier oils, it is believed that sufficient intelligence would be brought to bear upon the problem to result in its early solution, and thus a great benefit would be bestowed upon the automobile art, the realization of which will be much delayed if left to the initiative of the manufacturers. Some of the wealthy automobile organizations or individuals unselfishly interested in the progress of the automobile, could not, it is believed, do better than to stimulate invention along such lines, in such a manner.

The Sparking Coil.

By E. J. Stoddard and C. W. Burrows.

(Concluded from Issue of May 21.)

A coil, with a nearly complete magnetic circuit, is shown in Fig. 4. A is a U shaped core, around which the coils are wound, and B is a straight armature extending between the ends of the U shaped core and having a piece of wrapping paper interposed between it and the legs of the U shaped core.

The coils are wound around the U shaped core, and are divided into five groups, as indicated in the figure. The whole number of coils are connected so as to form one continuous wire, but are led out to switch points 1, 2, 3 and 4 at the end of each group. One end of the wire forming the whole number of coils is secured to a binding post C and the other to a binding post D. E is a switch arm adapted to contact the different points 1, 2, 3, 4 and 5. F is a binding post connected to the pivot of the switch arm E. By connecting the binding posts C and F with the usual make and break apparatus on a gas engine we have a self induction coil in which we may vary the number of coils to suit our batteries or time of contact.

Let us assume that we have in circuit 258 turns of No. 13 wire, having a resistance of .4 ohm. Using 6 cells of the Nungesser battery, we would have a total resistance of $.06 \times 6 + .4 = .76$ ohm. The voltage of the battery is $.75 \times 6 = 4.5$. The length of the magnetic circuit is about 12 inches $= 30.48$ centimetres. Therefore we have $258 \div 30.48 = 8.46$ turns per centimetre. With one ampere flowing, we have a field of $1.257 \times 8.46 = 10.63$ lines per square centimetre. Referring to the magnetization line A D' of Fig. 1, we see that this field corresponds to a flux density of about 4,500 lines per square centimetre through the core. The cross section of the core is about 10 square centimetres, and the total flux, with one ampere flowing through the coil, is therefore $4{,}500 \times 10 = 45{,}000$ lines, and the coefficient of self induction is $4500 \times 258 \div 10^8 = .116$. We have now all the data necessary to calculate points for the time-current curve, which

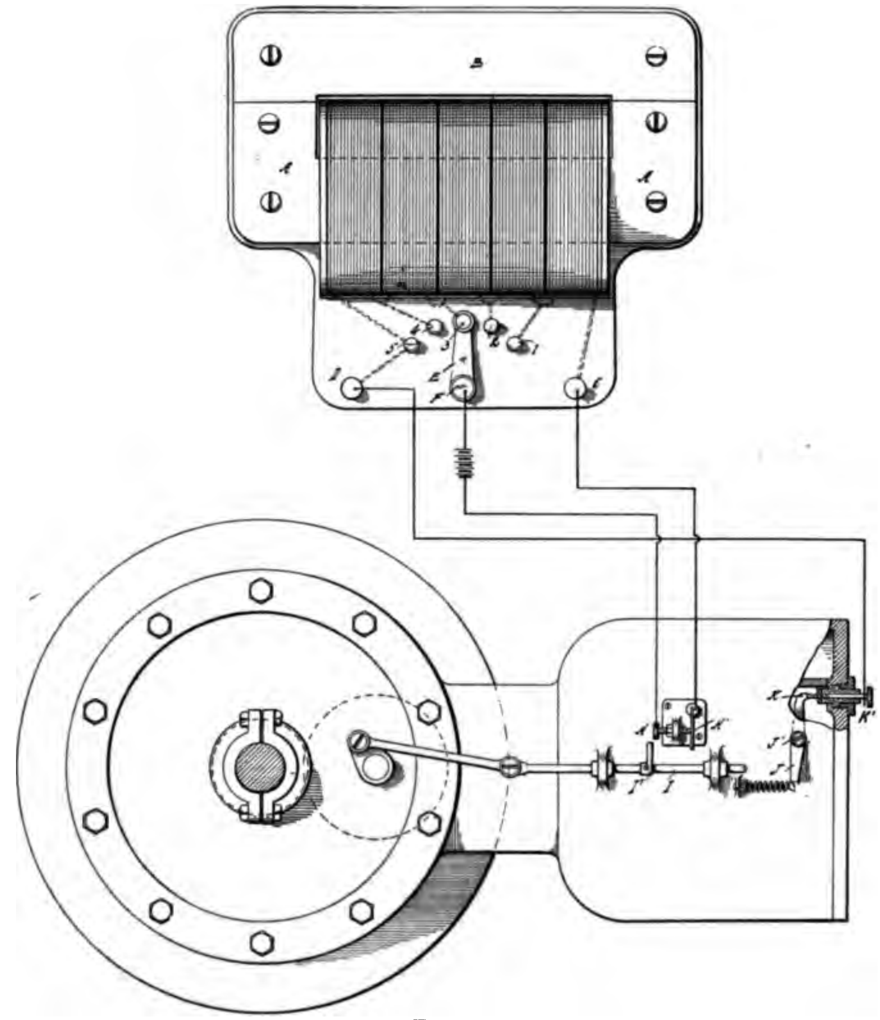


FIG. 4.

when plotted gives us the line A C of Fig. 5.

The line A D is a similar curve for what I have called the Edison coil, but which is a type made by a number of makers, and is thought to be the best on the market.

In both forms of the coils for which the curves of Fig. 5 are drawn, the magnetic flux is practically proportional to the current flowing. As the abscisses represent time and the ordinates current, the area under the curves represents the quantity of electricity that has passed through the wire. We have taken this as representing the draft on the battery. Let us now draw two curves in which the abscisses represent the draft on the battery and the ordinates the total magnetic flux, taking the values from Fig. 5. That is, for the magnetic flux at the end of each .01 second we take 7,125 times the amperes of current, and for the closed circuit coil 45,000 times the current, and lay these off as ordinates. The abscisses we take proportional to the areas under the curve at the same intervals of time. This gives us the line A C for the closed circuit coil and the line A B for the "Edison" coil. It will be observed that in the closed circuit coil for something less than half the expenditure of current we obtain something over four times the magnetic flux.

Now this flux of magnetism is our sparking force, the rate of its variation measures the voltage of our sparking current, and its total quantity is proportional to the total quantity of electricity that may be used, under appropriate conditions, to form the spark.

The rate at which this flux falls off when the magnetizing circuit is broken is at present unknown to the writer, and the laws which govern it are either not seen at all or but dimly.

Prof. S. P. Thompson in his "Elements of Electricity, etc.," page 555, says: "Iron is found to retain its magnetic properties even for oscillations of the frequency of one million per second." This is very much more rapid than any variation of current with which we are dealing. It would seem therefore that the iron in itself should not form any obstacle to obtaining as great a variation of the magnetic flux as we desire. The number of coils does, however, seem to have an effect upon the time endurance of the induced current, as also the size of the wire. The larger the number of turns and the larger the wire, the longer the induced current seems to endure.

As an illustration of the endurance of the induced or sparking current, we will note the following experiment: We took a coil like that of Fig. 4, that had a good many turns of rather large wire upon it. and made the energizing circuit through

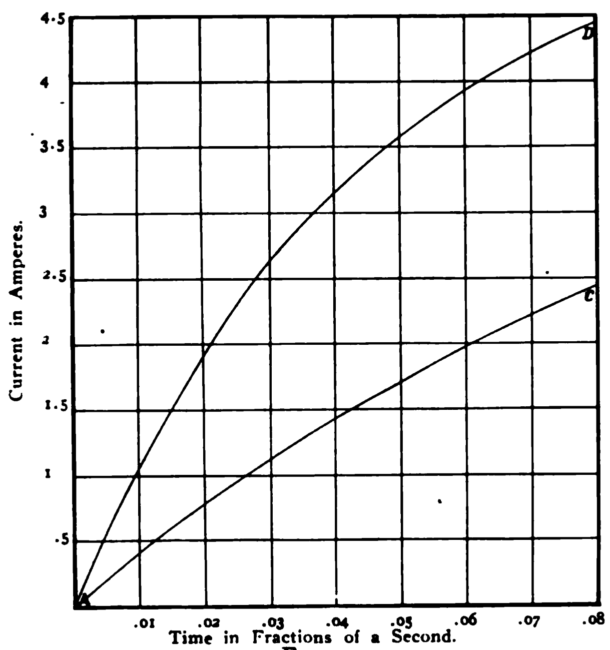


FIG. 5.

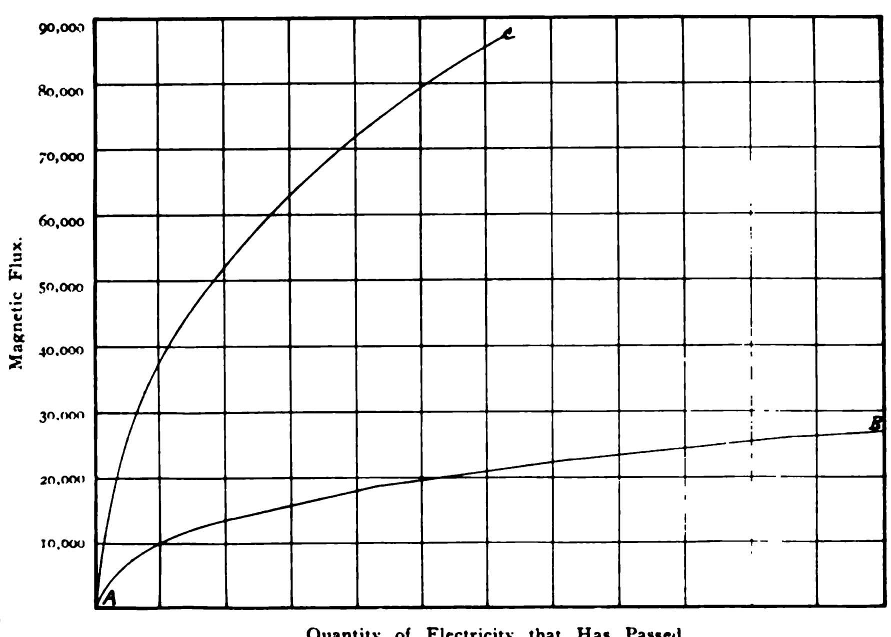


FIG. 6.

an iron plate having comblike rectangular teeth about half an inch wide and half an inch apart. The self induction of this coil was so great that one had to consciously delay the motion of his hand in making contact in order to get enough current through to produce a spark. If the contacting point was moved with a leisurely motion over the teeth there would be no noticeable spark. Now if the contacting point was held for a moment on the first tooth and then moved as rapidly as possible over the other teeth, a series of bright large sparks would be obtained, as the point passed over the different teeth. We next fixed an ordinary piston break upon the lathe so that it would be operated as in an engine, and arranged a second pair of points so that the circuit would be made through them and broken at an adjustable interval after the circuit was broken through the first pair. If the interval between the first and second break was properly adjusted we obtained two good sparks of about equal size. When the breaks were brought nearer together the second spark increased in size and the first spark diminished in proportion.

The double spark effect varied very much with the coil used. With the so called "Edison coil" it was difficult to get a good result, while with the closed circuit coil, especially with many turns of wire upon it, the effect was certain and very marked.

Having thus ascertained the best form for the core we next turned our attention to attempt to avoid an undesirable amount of impedence when the energizing circuit was made, while retaining the high voltage of the induced sparking current due to a large number of turns.

We first wound on a reasonable number of turns of large wire, and used this as the energizing coil, and provided a make and break apparatus for this circuit. We next wound over the first coil a second coil of a larger number of turns of finer wire (No. 22, d.c.c., was generally used). We arranged a reciprocating rod to be actuated by the lathe, so that it should break the primary circuit while the secondary was complete and then break the secondary to produce the spark.

We also found it necessary to proper working that the secondary circuit should be made just before the primary was broken.

With this arrangement we obtained very good large sparks at the secondary break of sufficient voltage to penetrate a piece of paper placed between the points.

The adjustment between the primary and secondary break was not necessarily very fine or delicate. We obtained a good spark at the secondary when the primary was broken at an interval before the secondary which we estimated to be .025 second.

Our present arrangement is illustrated diagrammatically in Fig. 4.

H, H^1 is the make and break for the primary circuit, H^1, C, 3, E, F, H. H, H^1 is secured to, but insulated from, the engine cylinder on the outside, where it can be seen and kept in good order. I is a rod reciprocated by the engine and adapted to contact the lever J, to rock the same, and separate the points or electrodes K, K^1 in the cylinder. I^1 is a lug upon the rod I, adapted to contact the lever H^1 and break the primary circuit at the screw H. The lug I^1 is adjustable upon the rod I, so that it breaks the primary circuit just before the rod strikes the lever J. As soon as the lug I^1 comes into contact with the lever H^1 the circuit corresponding to the secondary is complete through all the turns of the coil, thus: From C to H^1 to I^1 to J, through the cylinder to K, to K^1, to D and thence through the entire coil back to C. When the rod I strikes the lever J, K and K^1 are separated, and the spark is produced in the cylinder.

It is somewhat better to place a small condenser across the break between H and H^1. With this arrangement good sparks are obtained with certainty, and the current has so high a voltage that it will penetrate a piece of paper such as this is printed upon, placed between K and K^1; the spark has sufficient volume to ignite such a piece of paper and cause it to burst into flame. A rather slow break between K and K^1 seems preferable, and a reasonably quick break between H and H^1, though within reasonable and convenient limits no particular care upon this point seems to be necessary.

A double spark, such as we have described above, may be obtained between K and K^1, though when a condenser is used the second spark is not good.

No greater obstruction than is afforded by a piece of paper placed between the points is ever apt to occur in a gas engine cylinder, and if it does and is very much greater, the fact will at once be indicated by sparking between H and H^1. In the ordinary operation there is little or no sparking at the primary break.

As the break between K and K^1 need not be particularly sharp, the arms of the lever J K may be made short. We have the make and break for both the primary and secondary upon a single sparking plug of the usual size, about ¾ inch diameter.

It will be noticed that the self induction of the primary may be varied by the turning of a switch to suit the battery or engine speed. The voltage of the sparking current may be made high enough to overcome obstructions and yet not be high enough to make it difficult to insulate. The adaptability of the slow break indicates an enduring spark.

WANTED.

Subscribers of the Horseless Age who are willing to solicit subscriptions from their friends on a commission basis.

Address EDITOR HORSELESS AGE.

The Motor Bicycle Endurance Contest.

By C. C. Bramwell.

The first motor bicycle run of any importance, so far organized in this country, started from in front of the Victoria, on Dartmouth street, Boston, Mass., July 4, at 8 o'clock in the morning. There were thirty-four entries and thirty-three starters. This is a good showing, for only one entry failed to start. The following machines were entered: Royal, 3; Holley, 2; Indian, 3; Mitchell, 5; Marsh, 10; Cleveland, 1; Rambler, 1; Crescent, 1; Columbia, 1; Orient, 3; Stratton, 2; Auto Bi, 2.

All the machines were belt or rope driven and, I think, all had jockey pulleys or idlers for tightening the belt. None of them had any means of freeing the motor save by taking off the driving belt. They were all chain driven bicycles with the motor incorporated into the frame or simply attached to the frame by lugs, as suited the fancy of the designer. The motor was mounted either with the combustion chamber immediately behind the steering head, with its centre lying parallel with the lever tube of the frame or else mounted with the crank case resting at or near the crank bracket of the bicycle, with the cylinder standing vertical. All the machines were alike rear driven.

The jump spark only was used and with coils without vibrator. The electrical arrangements on all the machines were too delicate, too exposed to wet, mud and oil, and of too small capacity. Atomizing carburetors were used exclusively and in all cases (I think) the level of fuel was maintained by a float. The mufflers were inadequate in all cases. The exhaust could be heard for six or eight blocks, easily. The finish on all was good.

None of the machines entered exhibited any striking ideas in designing a "motor bicycle," but several showed considerable thought in combining an ordinary, heavy free wheeled bicycle, with a small motor attached more or less cleverly to the frame. A gasoline tank placed somewhere else, a battery in another place and a spark coil in still another locality, with wires running under and around the tubing and more or less exposed. The gaso-

G. V. Rogers on a 2 horse power Mitchell.

Harold Brown on a 1¾ horse power Marsh and F. W. Tuttle on a 2¼ horse power Cleveland.

line tank is connected to the carburetor (which, by the way, is placed somewhere else) and the carburetor is piped to the inlet of the motor.

The idlers used by some makers were of very poor design, being only about 1½ inches in diameter. The idler will have to be dispensed with sooner or later.

Some makers argued weight was no objection, but was a good feature, as a heavy machine was more comfortable than a light one. Others argued that the light bicycle was the only thing, because it did not injure the operator so much "when it fell on him" (food for thought).

Insulating tape was in evidence on some machines for the purpose of holding the various operating levers where placed. This was accomplished by winding the tape criss cross about the stud on which the levers moved and about the levers themselves. Such levers should be mounted between friction pads of leather, held tight by a split steel washer or short coiled spring. They would then "stay put."

I was surprised and disgusted to find that the organizers of the run had moved all the entries from No. 13 upward one number, making No. 13 read No. 14, and so on. This was apparently done to throw out the No. 13. And, worst of all, the former No. 13 was a Boston man, nay, even a Harvard graduate! Verily, our much vaunted "liberal education" needs some burnishing up. If our schools and colleges cannot eradicate this relic of barbarism from the minds of the public, we had better shut them up and spend the vast amount of money they absorb on making good roads or some other rational improvement.

THE FINISH.

This contest, which was promoted by the Metropole Cycling Club, of New York, comprised a run from Boston to New York.

The entries follow:

TABLE OF STARTERS.

Rider.	H. P.	Machine.
Charles A. Persons, Worcester, Mass.	2	Royal.
Emil Hafelfinger, New York	1½	Royal.
George M. Holley, Bradford, Pa.	2¼	Holley.
George M. Hendee, Springfield, Mass.	1¾	Indian.
George W. Sherman, Brooklyn	1¾	Indian.
O. L. Pickard, San Francisco, Cal.	1¾	Indian.
G. V. Rogers, Racine, Wis.	2	Mitchell.
K. H. Beebee, Racine, Wis.	2	Mitchell.
W. F. Seaman, Mineola, L. I.	1¾	Mitchell.
Henry Allmen, New York, N. Y.	2	Mitchell.
Charles M. Burnham, Waltham, Mass.	1¾	Marsh.
Harold H. Brown, Boston, Mass.	1¾	Marsh.
F. W. Tuttle, Hartford, Conn.	2¼	Cleveland.
J. M. O'Malley, Hartford, Conn.	2¼	Rambler.
N. P. Bernard, Hartford, Conn.	2¼	Crescent.
Joseph I. Russell, Hartford, Conn.	2¼	Columbia.
A. A. Hoyt, Whitman, Mass.	1¾	Marsh.
A. R. Marsh, Brockton, Mass.	1¾	Marsh.
W. T. Marsh, Brockton, Mass.	1¾	Marsh.
Joe Downey, Brockton, Mass.	1¾	Marsh.
H. E. Lane, Brockton, Mass.	1¾	Marsh.
Robert Halsall, Brockton, Mass.	1¾	Marsh.
G. L. Marsh, Brockton, Mass.	1¾	Marsh.
L. H. Roberts, Waltham, Mass.	3	Orient.
William B. Jameson, Waltham, Mass.	3	Orient.
H. J. Wherett, Brooklyn	2½	Stratton.
C. Mankowski, New York	2	Mitchell.
Charles A. Root, Jr., Brooklyn	1½	Stratton.
Charles S. Henshaw, Boston	2½	Auto-Bi.
George P. Jenkins, New York	1¾	Marsh.

Geo. M. Holley on a 2¼ horse power Holley.

The classification was as follows:

Class A, motors of not over 1¾ horse power; Class B, motors of more than 1¾ horse power, and not over 2½ horse power; Class C, motors of more than 2½ horse power, and not over 3 horse power.

The maximum speed was 15 miles an hour, and minimum speed was:

For Class A— 8 miles an hour.

For Class B—10 miles an hour.

For Class C—12 miles an hour.

The first contestant to finish arrived at 5:18 p. m. July 5, the last of those to finish reaching the headquarters of the Met ropole Cycling Club, 10 West Sixtiet street, New York, at 9:05 p. m. Of th thirty-two entrants, thirty-one started an eighteen reached Hartford at the end c the first day's run. Of these one was di qualified and seventeen started the ne day. Of the thirteen who failed to rea Hartford seven had misused their coast brakes in the early part of the contest l steadying their machines with the through the greasy roads met with whi running the motors at full speed inste of controlling the motors, thereby destro ing their efficiency and causing brea downs. In one case the brake arm w broken off. Of the remaining six two fe one retired from stomach trouble and a

Geo. M. Hendee on a 1¾ horse power Indian

The Finish.

Name.	H. P.	Bicycle.	Percentage. S. Framingham.	Worcester.	Warren.	Springfield.	Hartford.	Meriden.	New Haven.	Bridgeport.	Greenwich.	New York.	
Geo. M. Holley, Bradford, Pa.	2¼	Holley.	100	100	100	100	100	100	100	100	100	100	Total, 1,000
Geo. M. Hendee, Springfield, Mass.	1¾	Indian.	100	100	100	100	100	100	100	100	100	100	Total, 1,000
Geo. W. Sherman, Brooklyn, N. Y.	1¾	Indian.	100	100	100	100	100	100	100	100	100	100	Total, 1,000
O. L. Pickard, San Francisco, Cal.	1¾	Indian.	100	100	100	100	100	100	100	100	100	100	Total, 1,000
N. P. Bernard, Hartford, Conn.	2¼	Crescent.	100	100	100	100	100	100	100	100	100	100	Total, 1,000
L. H. Roberts, Waltham, Mass.	3	Orient.	100	100	100	100	100	100	100	100	100	100	Total, 1,000
William B. Jameson, Waltham, Mass.	3	Orient.	100	100	100	100	100	100	100	100	100	100	Total, 1,000
N. T. Marsh, Brockton, Mass.	1¾	Marsh.	100	94	100	100	100	100	100	100	100	100	Total, 994
F. W. Tuttle, Hartford, Conn.	2¼	Cleveland.	100	100	83	100	86	100	100	100	100	86	Total, 959
Emil Hafelfinger	1½	Royal.	100	100	100	100	44	100	100	100	100	100	Total, 944
Joe Downey, Brockton, Mass.	1¾	Marsh.	100	95	100	100	64	100	96	69	100	28	Total, 852
Henry Allmen, New York	2	Mitchell.	100	100	75	100	1	100	61	19	1	1	Total, 558
C. Mankowski, New York	2	Mitchell.	100	97	1	1	1	100	1	1	1	1	Total, 304

other quit because he could not replace a broken pedal.

On the second day, of the seventeen starters one retired for no apparent cause, being in good condition and having made a perfect run so far, and another ran into a telegraph pole.

The remainder have as yet assigned no reason for their failure to finish.

A table of the thirteen who completed the run, with their records, is on page 32.

Those having 1,000 points will receive gold medals. Those with 994 and 959 respectively, will receive blue ribbons and bronze medals.

The contestant making 944 points will have a red ribbon and a bronze medal; the others will each receive a bronze medal.

A Letter Home from an American Apprentice Boy in a French Automobile Works.

I go to work every morning at 5 o'clock and return at 7 o'clock.

You will be pleased to hear that I am getting along very well. The works start at 6 o'clock and close at 6 o'clock. We have one hour and a half for dinner.

The repairing department at present occupies the front of the shops. It is divided into two parts, one for the motors and the other for the gearing. I am at present at work on the gearing. Once I have learned it thoroughly I shall go over to the motors. The principal part is the gearing and running parts, for there are no less than twenty systems of "engrenages" used by this firm.

The system of repairing is perfect. A wagon which is to be repaired is brought to a road in front of the depot devoted entirely to the testing of machines. Experienced men are there to try the machine and find out what is wrong. A board, on which is written all that has to be done, is attached to the machine, which is then taken into the department I am in. Our work is to take the machine apart and if the motor is to be fixed we take it out and with a traveling crane we transfer it to the motor department. All the pieces we put into a basket and a laborer takes it away and cleans the parts.

In the meantime we work at other jobs and when we get the basket back we put the machine together again. The first day I was there I took the motor out of a 20 horse power machine and brought it over to the motor department. I then took out all the gearing and fixed the teeth of the spur wheels. I have the case together again now and when the motor is finished I will put it together again.

I was at work on the brakes of a 75 horse power motor yesterday afternoon. This machine will run in the Paris-Vienna race on the 26th of this month. I also worked on an 18 horse power motor of four cylinders. I had to fix the steering gear. The owner of this machine was in a hurry to get off to Vienna and was waiting and watching us, accompanied by his wife. They were both dressed up in real automobile costume. I got my first "pourboire" from this man (20 francs). I did not like to refuse it, because the pay of the men depends on the amount of "pourboire" they get.

The men with whom I am working are all very kind. They advise one another and tell each other what they did before when they had the same "reparation" to make.

I am heart and soul in my work and I shall certainly succeed in learning thoroughly all that is to be learned about motor cars. The "tourists" left yesterday for Vienna. They are supposed to examine every inch of the road between Paris and Vienna so as to prevent any mishap from occurring to the racing cars. It is at the same time a kind of a race, for they all wish to arrive at the daily destination first. In the rear of these tourists a repairing car moves on slowly and puts the wounded on their feet.

The race of the 26th is to be one of the greatest races ever run, for the route is through Switzerland. Some telegrams have already arrived stating that the roads are in a dreadful condition. The time record between here and Switzerland, I am confident, will be broken, but the run through Switzerland will lower the average considerably. It is understood here that Monsieur De Knyff will win if he does not kill himself. He arrived here this afternoon from Geneva. I saw the "contre maitre" of our department running De Knyff's car at 120 kilometres an hour. The speed is something awful. No words could possibly describe it. A train may go very fast, but since it is long you can get a good glimpse of it; but what you see of the auto going at such a speed is only the image which remains before the mind's eye, after the object has passed.

J. J.

The Chicago Endurance Contest.

Up to July 6 the number of entries for the Chicago Automobile Club's 100 mile endurance contest, to be held July 12, had reached fifteen. The list of entries is appended. Edwin F. Brown has been appointed referee. The judges of the gasoline class are Messrs. Rowntree, Hayden and Dennison, Mr. Rowntree, of 85 West Jackson boulevard, being the chairman. W. L. Hibbard, of 260 Wabash avenue, is chairman of the judges' committee for the steam class. R. Harry Croninger will act as official starter.

Telegraphic advices from Chicago Tuesday morning state that the run has been postponed until August 2, the reason assigned being the bad condition of the roads owing to the heavy rains.

Difficulties of Soldering Aluminum.

The reasons why aluminum is difficult to solder are stated by the "Journal of the Franklin Institute" to be as follows:

"The difficulties encountered are threefold: (1) The high heat conductivity of aluminum, which abstracts heat rapidly from the joint and (2) galvanic action between the aluminum and the metals of the solder by which the aluminum (the more electro positive metal) is corroded and the joint destroyed. It is comparatively easy to make an apparently perfect soldered joint of aluminum with various mixtures of zinc and tin, for the reason that when freshly made the adherence is all that could be desired. The effects of the galvanic corrosion may make themselves apparent after the work has been exposed to atmospheric influences for some months. The rapid heat conductivity of the metal can be practically obviated by applying artificial heat to the joint while the solder is being applied. It has been proposed to use aluminum in considerable proportions in the solder to avoid the effects of galvanic action, but while this artifice might accomplish the desired result, the joints cannot be made with the soldering iron, because of the high heat required to melt the alloy. A perfect solder for aluminum is still to be found."

Table of Entries in Chicago Run.

Name.	General Description.	No. of P'ss'ng'rs.	Motive Power.	Weight.	Water Capacity.	Gasoline Capacity.	Tires.	Rated H. P.	No. of Cylin.	Bore.	Stroke.	Normal Speed.
Winton........	Tonneau......	..	Gasoline.	1,960 lbs.	8½ Gals.	10 Gallons.	Goodrich 32×4".......	16	2	5"	6"	700
Autocar.......	"	2 or 4	"	1,425 "	4 "	10 "	Dunlop 3"............	8½	2	4"	4½"	1,400
Phillips........	"	4	"	1,600 "	10 "	20 "	Clark 3½"............	14	4	4½"	5"	600
Winton........	Touring car ..	2	"	1 950 "	8½ "	10 "	Goodrich 32×4".......	15	2	5"	6"	700
Winton........	"	2 or 4	"	1,950 "	8½ "	10 "	" do'ble tub. 4"	15	2	5"	6"	700
Oldsmobile...	Runabout. ...	2	"	800 "	4 "	4 "	Fisk or Diamond 2½"	4	1	..	..	...
Oldsmobile....	"	2	"	800 "	4 "	4 "	" " " "	4	1	..	..	...
Elmore........	"	2	"	1,000 "	6 "	8 "	Diamond 28×3".......	5	2	4"	4"	600
Pierce.........	Motorette.....	2	"	800 "	6 "	4½ "	G. & J. 26×3".........	3½	1	3½"	3½"	1,600
Packard.......	Tonneau..	4	"	2 250 "	5 "	10 "	Diamond 34×4".......	12	1	6"	7"	600
Packard.......	"	4	"	2,200 "	5 "	10 "	Dunlop 34×4".........	12	1	6"	7"	600
Renault.......	"	5	"	1,330 "	25 litres.	27 litres.	Michelin 750×85 mm..	8	1	100 mm.	110 mm.	1,400
Rambler.......	Runabout.....	2	"	1.200 "	3 gallons.	6 gallons.	Diamond 2½".........	4½	1	4½"	6"	600
Rambler......	"	2	"	1,200 "	3 "	6 "	" "	4½	1	4½"	6"	600
Rambler......	"	2	"	1,200 "	3 "	6 "	" "	4½	1	4½"	6"	600

BEGINNERS PAGE.

Fitting and Wiring of a Gasoline Engine.

In the previous articles the various parts of a gasoline engine, and its accessories, have been considered in detail, and in this article the piping, wiring, etc., of the complete equipment will be described. To this end the drawings below have been prepared, which show two views of a single cylinder, vertical motor, with all its appurtenances. It must not be assumed that in a vehicle the parts always occupy the same relative position as here shown. That is not the case. The arrangement varies naturally in each vehicle with the general design, and in making this drawing a compact arrangement of the parts has been kept in view, as well as a complete exposition of all the parts and connections in only two views.

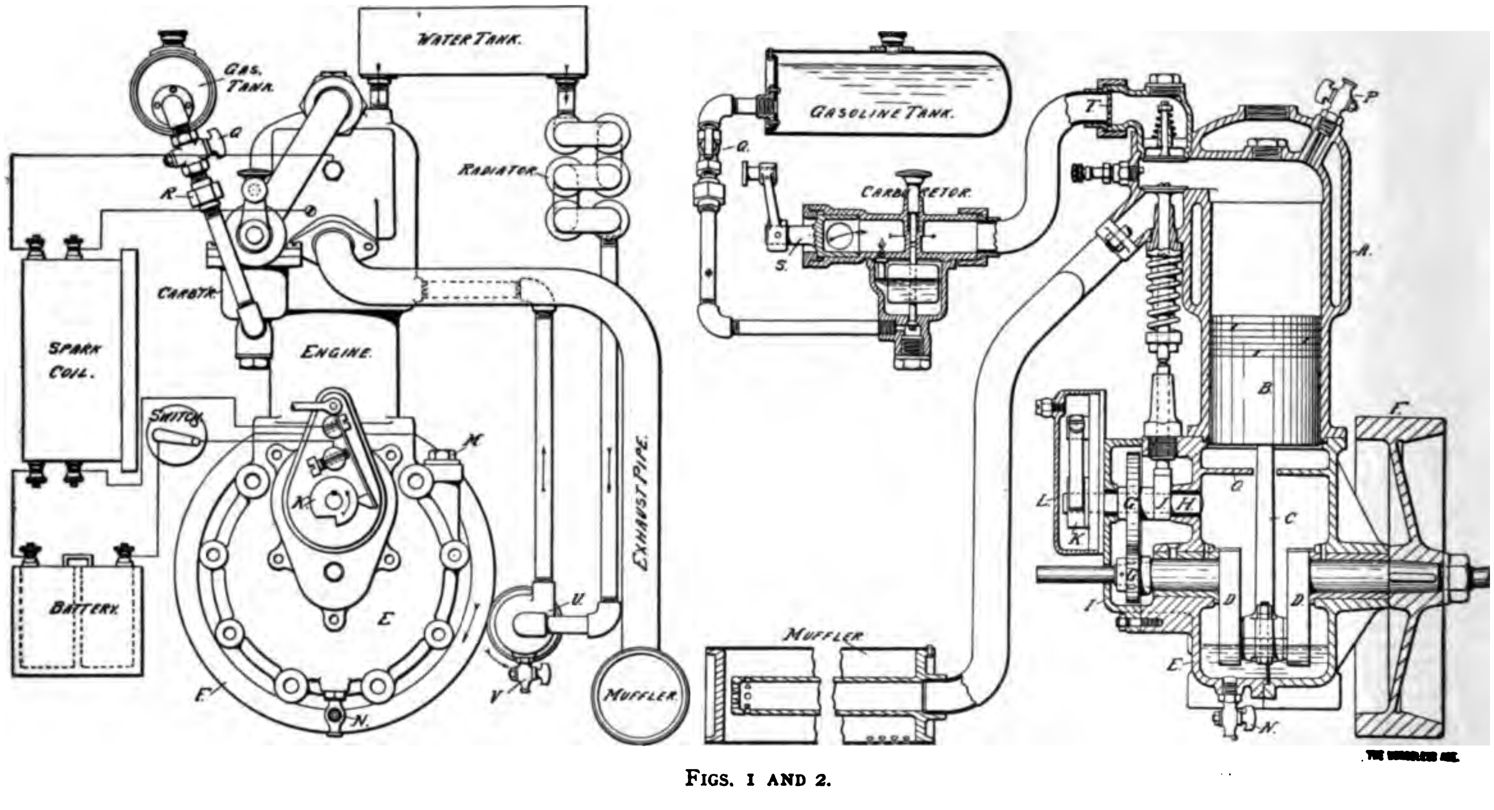
The drawing on the left represents a side elevation of the engine, and shows particularly the electrical connections and the piping for the cooling water. The drawing on the right is a sectional elevation of the engine, and shows more particularly the arrangement of the engine parts themselves, means for lubrication, the gasoline tank, carburetor and connections, and the muffler and its connections.

Referring to the sectional elevation, A is the water jacketed cylinder of the engine in which is disposed the reciprocating piston B, shown at the lowest point of its stroke. The piston is connected by the connecting rod C to the crank D, which has two supporting bearings in the crank chamber E. The crankshaft extends beyond the bearings in the casing, and the part projecting from the bearing on the right has a flywheel F keyed to it. This flywheel is provided with an internal, tapered surface on its rim at the outer side, from which the power may be taken off by means of a friction clutch, as will be described later on. The part of the crankshaft projecting from the bearing or crank casing on the left hand side is provided with a gear pinion G, which forms part of the reduction gearing for operating the exhaust valve and the circuit breaker of the igniter. It may be stated here that a high tension or jump spark ignition outfit is shown in the drawing. The pinion G meshes with a gear wheel G', having double its number of teeth, and turning therefore at one-half its rotative speed. This gear G' is fastened to the cam shaft H, which has bearings in the crank casing and in the gear casing I. The cam shaft carries the exhaust cam I and the circuit breaker cam K. The circuit breaker, it will be noticed in the drawing, is arranged outside the casing for the reduction gears, and is provided with a special casing L. Casing L and the base to which it is attached are angularly movable around the cam shaft to vary the time of ignition.

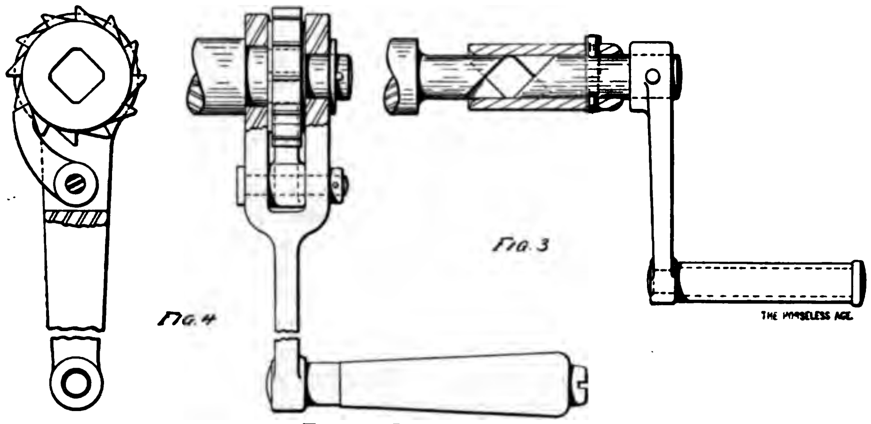
The lower part of the crank casing E contains a certain amount of lubricating oil, into which the crank dips at every revolution, as shown. The oil is introduced into the casing through an opening closed by a plug M, and may be completely withdrawn by opening the cock N. In order that not too much oil is splashed into the cylinder the crank casing is provided with a wall O near its joint with the cylinder, with a slot to permit the passage of the connecting rod. On top of the cylinder is seen a "compression cock" P, by means of which the compression space is opened to the atmosphere in starting the engine, the object being to reduce the effort required in turning the crank over and compressing by hand.

The gasoline tank is shown on a level with the upper part of the engine. Usually the tank is cylindrical and provided on its upper side with a filling opening closed by a screw cap. The cap usually has a minute vent to allow air to pass into the tank as the gasoline is emptied out. The gasoline tank is connected to the carburetor by either regular iron piping or else by a copper tube. In the pipe connection is placed a cock Q to shut off the gasoline, and somewhere farther along a removable piece R, with a gauze strainer to catch any solid particles in the gasoline before it reaches the carburetor.

The carburetor shown is of the constant level, spraying type, but somewhat differently constructed than the one shown in our article on carburetors. A plug at the bottom of the carburetor permits emptying all gasoline from tank, carburetor and piping. The air enters the carburetor on the left and the air openings are controllable by means of a throttle valve S which is connected to a lever located convenient to the operator's seat. It should be mentioned here that while with this particular carburetor the admission of air to the carburetor is throttled, the more usual arrangement is to locate the throttle valve between the carburetor and the intake valve. In the intake piping near the intake valve is placed



FIGS. 1 AND 2.



ENGINE STARTING CRANK.

a metal gauze screen T, the object of which is to prevent explosions taking place in the carburetor if the intake valve should fail to close, as by sticking in its guide.

The valves and igniter plug are arranged as has already been fully explained. The exhaust gases are carried off to the muffler as shown. The muffler is usually located low on the vehicle and at a considerable distance from the engine. It is well to have as few sharp bends in the pipe leading to the muffler as possible.

In the drawing to the left the battery, spark coil and switch are shown on the left and the wiring connections indicated, these being the same as already described in the article on jump spark ignition. The spark coil and battery are always located at some convenient place in the vehicle body, frequently at a considerable distance from the engine. The switch is located convenient to the operator. On the circuit breaker the cover is shown removed in this drawing.

The water cooling system is arranged as described in a recent article, the centrifugal pump U being driven from the flywheel. At the lowest point of the water cooling system (here the pump) a cock V is located, by means of which all the water may be drained from the tank, jacket and pipes, as is required in extremely cold weather to prevent the water from freezing and bursting the jacket.

STARTING THE MOTOR.

In starting a gasoline motor it must be turned over by hand. This is generally accomplished by means of a ratchet crank. Two constructions of such cranks are shown in Figs. 3 and 4. The crank in Fig. 3 is taken off the shaft after the engine is started, but the one shown in Fig. 4 remains in place, hanging loosely on the engine shaft after the engine is started.

Instead of applying the crank to the engine shaft directly it may be applied to a shaft which is chain connected to the engine shaft. This shaft is sometimes so placed that the starting crank can be turned by the operator while in his seat.

To start an engine the gasoline must be turned on or a first charge pumped into the carburetor, the igniter switch closed, the compression cock opened and the crank turned over. When the engine has started to run the compression cock is immediately closed.

...COMMUNICATIONS...

A Suggestion for Reachless Construction in Steam Carriages.

BROOKLYN, June 30.

Editor HORSELESS AGE:

To the individual who gives attention to automobile design it must seem remarkable that so few manufacturers of steam vehicles have adopted the system of the metallic, reachless frame, so largely made use of by the gasoline people. It would appear to most of us a poor policy to use in stationary practice a wooden frame, mortised and tenoned together, as the bed plate of a steam plant, and certainly there is nothing about the requirements of the automobile that any more justifies one in hanging a boiler and engine upon such a framework. It is perhaps not necessary to more than mention some of the objections to the method almost universally employed at present.

Simple allusion may be made in passing to the inaccessibility of an engine stowed away under a wagon seat; to the frequent breaks and leaks in the "goose neck" connection between boiler and engine; to the liability of charring of the wooden sills upon which boiler and engine are supported, and to the many faults of live rear axle, bearing within it three very important parts, viz., brake drum, driving sprocket and equalizing gear, all as far from the weight supporting wheels as possible, and as difficult to remove as conceivable.

It is the writer's opinion that it must soon be "up to" the steam builders to correct these basic and very important matters, as well as to develop little accessories that are largely "talking points" for the salesman. Not that there have not been some real improvements perfected of late in burner design, tank construction and so on—there certainly have.

Now, it is not intended for a moment that anything strikingly original shall be presented in this communication, but that the readers of it may have their attention called to a possible plan of construction, thereby perhaps stimulating some thought and, perhaps, experimentation, as well as to cause some interchange of ideas upon the subject through the columns of THE HORSELESS AGE.

In the first place it must be conceded that the rectangular, reachless frame of channel or I stock is far superior to the present tubular frame, with reaches and superimposed springs. Now suppose that upon the extreme rear of such a frame, enclosed within the body, but with so much overhang that the burner will clear the rear axle, we place the generator and the burner, thus securing clear space for a deep fire box, with 6 or 8 inches between the upper plate of the burner and the lower head of the boiler. This will give a fire in which a large proportion of the combustible gases do not escape out of the chimney unconsumed, which is now always the case, as proven by chemical tests.

Boiler, engine, etc., are all to be supported or attached to cross beams of the same stock as the frame, everything being riveted or bolted, not brazed. Next ahead comes the water tank, resting upon and secured to the frame, running partially around the boiler and well forward under the seat. Only one seat is possible, which, by the way, is a real objection to the plan proposed. Attached to the frame, immediately under the footboard, is the engine, lying horizontally, with its head toward the front, steam connected to the boiler by a copper tube made up with unions, which, owing to its length, will be sufficiently flexible without any rotating joints, which frequently leak. The engine should lie to the right of the median line, in order to be more accessible.

Upon the main shaft of the engine, where the sprocket is now found, is to be a pinion, with generous width of face, meshing into a large gear carried upon a countershaft suspended beneath the frame in such a manner that it may easily be detached for repairs to either of the sprockets upon its ends or to the equalizing gear, which the countershaft also carries. Spread beneath these parts is to be a sheet metal mud guard or drip pan, which could also contain an oil reservoir for splash lubrication. Surrounding the tank and boiler is the body, resting upon the frame to which it is secured by bolts and wing nuts, allowing its quick removal and complete exposure of all working parts for inspection and repair.

The driving sprockets, wheels, springs, axles, steering device and so on are to be as made by the gasoline vehicle builders abroad. The gasoline tank is to be in the extreme front under a hood, and to be attached with all its connections to the

frame, thus bringing it the greatest possible distance from the fire. Handles for the by-pass on the boiler feed, the gasoline supply valve, the valve controlling cylinder lubrication and the auxiliary throttle are any or all to be upon the wheel steering column. The throttle valve, reverse lever and brake pedal are to be outside the body and attached to the frame. In other words, every wooden object or structure about this proposed vehicle—except the wheels, if they are of wood—can be quickly removed, and the vehicle can be fired up and inspected running while stripped to a skeleton.

Incidentally, all steam, water, gasoline or air lines should be of flexible metal, avoiding joints and fittings where possible. Absolutely all automatic devices are to be omitted, excepting, of course, the safety valve. Labor saving devices for the operator are not to be considered for a moment, as the writer is convinced that the man and not the automatics should run the machine.

In the whole layout there are to be kept prominently in view, in the order mentioned, first, reliability, which carries with it durability; second, simplicity; third, accessibility. High efficiency or economical operation may well play minor parts as compared to the three matters above enumerated.

What, may I ask, is to be gained in constructing a machine that will cover 100 miles on a minimum of gasoline when such construction involves complications and multiplicity of contraptions that will surely prove enormously extravagant of time and material for repairs? It would seem more rational to put up a good old fashioned fire tube boiler and a well built, simple engine mounted upon a strong, everlasting frame, such as I have described, even if it shall take more fuel to push it along, and if there are more stops for water. The writer is not a prophet, nor the son of a prophet, but he feels quite safe in predicting that it is to be much upon these lines that the light steam vehicle must be set up to survive in the competition, which it can do only on condition that the claims so frequently made by the burner men, but not yet well demonstrated nor proven, that a naked flame can be caused to burn in a rapidly moving vehicle unaffected by wind and draughts.

W. M. HUTCHINSON, M. D.

Trans-Continental Motor Cycle Trip.

GOTHENBURG, Neb., June 30.

Editor HORSELESS AGE:

Some of the other people seem to be having so much grief in their experience, that it occurred to me to relate the story of a Mr. Caffman. This gentleman spent yesterday in our town and stated that he had come from Portland, Ore., without a mishap, save wrenching a tire off in a collision with an automobile in Denver, Col., that he had not even punctured a tire and so far as he knew his engine had never missed fire. He is traveling East and will quite likely call on you some time during the summer.

I forgot to say he is on a motor bicyle and his best day's run has been 237 miles.

Mr. Caffman says his only trouble comes from eye strain when attempting to keep a sharp lookout while running fast. He carries three sets of batteries, which are used alternately, and they have so far done the work without any difficulty.

W. J. BARTHOLOMEW, M. D.

[We hope Mr. Caffman has had his departure and arrival registered at the various towns en route. His alleged performance is beyond anything that has been accomplished with motor bicycles in this vicinity and unless he has taken that precaution he may find people who will doubt the account of his performance.—ED.]

A Power Pump for Pumping Up Large Tires en Route.

BEDFORD PARK, New York City, June 27.

Editor HORSELESS AGE:

I have designed and built a small trunk cylinder air pump, 1 5-16 inches bore by 2 inches stroke, which I have connected to my Packard automobile for the purpose of inflating the 4 inch tires, which I have found impossible to do properly with a small hand pump. The pump is connected to the countershaft, and when its services are required it can very readily be thrown into gear.

To do this and attach 10 feet of hose to the pump takes me about five minutes. (The hose is long enough to reach to either of the four wheels.) Then all I have to do is to jack up my wheel with the Barrett auto jack (which I always carry with me), and let my engine and pump do the rest.

This little pump now relieves me of the hardest work I have ever been called upon to do in connection with an automobile.

The pump certainly would be a blessing to anyone having a puncture in a 3 or 4 inch tire on a sweltering hot summer's day.

The pump can readily be built to attach to any kind of automobile.

C. A. DUERR.

The Cause of High Fuel Consumption.

DALLAS, Tex., June 29.

Editor HORSELESS AGE:

I have been very much interested in the letters from Mr. Benson and Mr. Bellefleur, and I agree with Mr. Benson that if a man watches his water glass—as he should—he would be able to tell when the water was trapped by the checks, as there would then be no variations in the water level, and, so far as the engine getting on a dead centre is concerned, I don't quite understand how a two cylinder engine, with cranks set on the quarter, can get on the centre.

I have run my carriage 2,500 miles, and have always been able to start. I have had very little trouble as compared to others. I broke an axle and a reach, which the factory was kind enough to replace without charge. I have had other small troubles, such, for instance, as J. T. S. has with his burner, being able to make only 7 to 8 miles with a gallon of fuel. I took the burner off, and at first glance thought it was all right, but, on taking a screw driver and trying the tubes, found that some of them were completely burned out. I put in a new set, then raised steam to about 75 pounds and adjusted the mixing tube so as to get blue flame, and now I have no more trouble with the burner. I have repaired three other burners, which were in the same condition. I believe the trouble was caused by letting the air pressure get too low, and now I never let my air get below 35 pounds.

Like Mr. Benson, I can stand all the troubles I have with my carriage, for I know when I start anywhere I will get there and get back and don't have to lead a horse along to pull me back. I will either run the machine back or camp with it until I get whatever is needed.

I expect to get a touring car soon, and it will be steam, as I do not mind the trouble of refilling the tanks.

D. W. MCELROY.

Excessive Costs of Repairs.

Editor HORSELESS AGE:

One day recently my gasoline carriage would not start. After some examination and tests it was found that there was water in the cylinder. I wrote to the factory and they said that probably the packing leaked, that a new gasket could be put in in an hour, and it would probably be all right.

A new asbestos packing was put in. It happens that this engine is so hung that when the cylinder is to be touched the body must be taken off and the motor blocked up, all of this work of disconnecting and taking off the body counting up a lot of time. In some wagons a gasket can be put in without removing the body.

The asbestos gasket did not last, and the men at the repair shop found that the faces of the cylinder and cylinder head had not been properly planed. The head rocked and no gasket would hold permanently. To have the dies made at a machine shop to properly plane off the surfaces would have been a big expense, and it was decided to do the job by hand. It took two men over three days, and, as I said, the bill was over $30. Had this work been properly done at the factory this work of building over would not have been necessary. Other carriages of the same make in this city have had to be treated the same way.

This is the sort of thing that puts the automobile business in disrepute, and I do not think from my observation and experi-

ence that the manufacturers of my machine are worse than others, but I ask is it right that the user, who pays a good price for his wagon, should be made to go to the expense of building over parts of machines?

I do not object to paying for repairs when they are caused by my own ignorance or carelessness, but when the machine is sent out from the factory imperfect the manufacturer, not the user, should be the one to put it in condition. My experience is not an unusual one, for I know of a number who have been through the mill in about the same way.

I have a good carriage, so far as its work is concerned, when it is in condition. Unlike Mr. Damon, I can often go 25 or more miles and get back all right without a bit of trouble. My criticism, however, applies to the manner in which the manufacturers permit the carriages to leave their hands, without proper tests.

A party having the same kind of a carriage as mine had a repair bill the other month of over $150. In these days of growing competition I cannot see how manufacturers can afford to let their patrons pay for experiments that should be tried out before putting the product on the market. T. W. BOLANDE.

Engine Speed as Affected by Time of Ignition.

Editor THE HORSELESS AGE:

I read in your last issue (July 2) the article written by Albert L. Clough, "How to Operate a Gasoline Carriage."

The article is a good one, and there are a number of points that should help a beginner.

I have had some experience with a gasoline runabout, and in one statement I do not agree with him.

He says: "It should be obvious to every operator that when the engine slows down under hard work on a hill the ignition should be set at a *later* point than when the carriage is speeding freely on the level." Again he says: "Never let your engine lose its speed when hard work is to be required of it, for if a gas engine is allowed to slow down too much when hard work is immediately ahead of it, it will 'pick up' with the utmost difficulty, if at all."

Now I know a *late* spark slows the engine, while an early one quickens it. If that is the case, why, when the engine slows down on a hill, should it be made to go still *slower* by giving it a *late* spark, when you want power and can get it *only* by speeding up your engine?

It seems to me Mr. Clough is not quite consistent in the paragraph quoted. Kindly explain to me whether I am wrong, or if it should not have read "early" instead of "late." L. T. BROWNE.

[Mr. Clough's statement is correct. Your statement that "a late spark slows the engine, while an early one quickens it," is only conditionally correct. The fact of the matter is that with fixed conditions of road and gear the engine runs fastest with the igniter set to a certain position, and either advancing or retarding the spark from this point would decrease the speed.

Now, suppose that you have been running along on the level on the high gear, with the engine running at its normal or fairly high speed, the igniter having been set to cause the spark to occur at the most advantageous time for this speed. If, now, you encounter a hill of, say, 4 or 5 per cent., your engine will naturally slow down. You can prevent this by changing the gear, but if from experience you know that changing the gear is not necessary to climb this hill you will probably continue on your high gear. In that case, as stated, your engine slows down on the hill, and if originally, when the engine was running comparatively fast, the spark occurred at the correct time, it must be retarded to occur at the correct time when the engine is pulled down by the harder work of hill climbing. In this particular case retarding the ignition would increase the speed of the engine, not as compared with what it was before the hill was encountered, but over what it might be if it was attempted to climb the hill without changing the time of spark, provided it was possible to take the hill in that manner.—ED.]

Peculiar Tire Filling.

Editor HORSELESS AGE:

For the benefit of whom it may concern I send you with this a sample of tire filling put in by Dr. A. H. Baldwin, Norwalk, Conn. Having had trouble with punctured tires I sent him a set to fill, sending the wheels and all, together with a check covering his advertised charge of 75 cents per half inch. I received the wheels back one week later, having on them tires of a different make, and evidently harder than anyone would wish to run. Nevertheless I thought I would try them, and was satisfied in the first eighth of a mile that I should jar loose every nut on my carriage if I went much further. Returning home I telephoned an order for a set of new tires, and, taking off one of the filled ones to examine, found that it had been cut open on the inside, maple blocks wrapped in thin rubber inserted and the cut fastened up with wire.

It seems to me that this sort of fraud should be exposed. It is impossible to believe that Dr. Baldwin can think tires so filled have any value.

W. S. SOUTHWORTH.

The Standpoint of the Committee of Fifty.

NEW YORK CITY, July 1.

Editor HORSELESS AGE:

Your representative called on me a short time ago, relative to the work of the committee of fifty, organized for the purpose of opposing the proposed ordinance for increasing the legal rate of speed of vehicles in the congested streets of New York city.

In the issue of your paper of June 18 this interview is set forth.

In the same issue of your paper, upon another page, there appears an editorial based upon the interview, and if you will compare the interview with the editorial you will find that the interview does not warrant in any respect some of the conclusions which you reach in your editorial.

In your editorial you say:

"There is one point especially set forth in that interview with which we cannot agree. It is to the effect that while the speed limit should remain what it is, slight excesses up to 10 miles an hour should not be prosecuted, but only the more flagrant violations. This statement implies an admission that the 8 mile limit is too low for the advantageous use of automobiles, that it is not required by the public safety, and is insisted on by the committee only to facilitate the conviction of flagrant offenders."

This is one of the statements made in the editorial which is particularly wrong. This committee does not take the position, and the interview to which you make reference does not state that the committee takes the position, that slight excesses up to 10 miles an hour should not be prosecuted; you will see by the interview itself that it is impossible to convict offenders unless they are going quite a little in excess of the legal rate—it is merely a question of possibility of conviction.

If you will look at the fifth paragraph of the interview mentioned in the editorial you will see that you have misstated the contents of the interview, and have drawn conclusions not warranted by the interview, and conclusions which are not in keeping with the work of the committee nor of the actions which they have taken.

Your paper, I am sure, has a large circulation among owners of automobiles, and if you will kindly make a correction of your editorial of June 18 it will be only fair to the committee of fifty, and only fair to yourself. HORACE E. PARKER.

[Without entering into an argument on the points thought to be at variance in the interview and editorial, we believe the committee of fifty would better serve what we think to be their final object—the protection of the public against excessive speeding in the city streets—by working in favor of a liberal speed ordinance, and exerting their influence toward a strict enforcement of same. In this they could count on the sympathy and support of the majority of automobile owners.

In the editorial referred to we mentioned that in large European cities the limit is over 11 miles per hour. We can now also point to Cleveland and Philadelphia. In the latter city speeds of 15 miles an hour are to be allowed in the outlying districts, 10 miles in parts in which there is comparatively little traffic and 7 miles in congested districts.—ED.]

For a Technical Automobile Association.

BROOKLYN, N. Y., July 7.
Editor HORSELESS AGE:

I have read with great interest your editorials and numerous letters from correspondents on the subject of the formation of a technical automobile organization. The advantages to be derived from such an institution are of course too obvious to technical men to need enumeration, and the chief object of further agitation should, in my estimation, be to determine the best and most expedient means for the organization of the society, its policy in general, location of headquarters, requirements of admission, etc.

H. W. Alden in a communication published in your issue of June 25 suggests that, as the National Association of Automobile Manufacturers' interests would be identical with that of the technical organization, a separate and independent organization would be useless. If their interests are identical, then Mr. Alden's suggestion is a good one. It seems to me, however, that the interests of the two organizations may not be absolutely identical, and if they are not, then a separate and independent organization should be formed.

Fundamentally such an institution should be an independent one, not allied in any way to a manufacturers' associaiton. The American Institute of Electrical Engineers and the American Society of Mechanical Engineers are not, to the best of my knowledge, allied to any such association, and probably never will be.

There are a few independent consulting engineers now in the industry, and in time there will be a great many, who might not care to be allied to the Manufacturers' Association.

It would be interesting to have more opinions on this matter.

J. EDWARD BALDWIN.

Explosive Engine Queries.

SALEM, Mass., July 5.
Editor HORSELESS AGE:

What power would an air cooled gasoline engine of 2⅝ inch bore and 4 inch stroke with 60 to 70 pounds compression develop at 1,000 revolutions?

Would it be large enough to carry two people in a very light four wheeled carriage up ordinary grades on country roads?

What is the bore and stroke of the air cooled De Dion motor that is used on the tricycle seating two people?

What is the length of compression space for a 2⅝x4 cylinder for 70 pounds compression? G. G.

[You will do well if you get 1½ brake horse power from the engine.

The engine would be far too small for a carriage carrying two intended for any practical purposes.

The De Dion motor you refer to has a bore and stroke of approximately 3 inches each and runs at nearly 2,000 revolutions per mile.

The compression space must be about one-third the displacement of the piston if you want a compression of 70 pounds gauge.—ED.]

FREDERICKSBURG, Va., July 6.
Editor HORSELESS AGE:

In your answer to I. W. H., in Volume 10, No. 1, you state that .214 cubic inch of liquid gasoline is the proper amount for one cubic foot of air. Can you tell me what would be the proper length of stroke of a crosshead solid plunger pump, diameter of plunger ⅞ inch, diameter of cylinder 11 inches, stroke 18 inches, explosion chamber equal to 6 inches of an 11 inch cylinder ?

What causes the disagreeable odor from exhaust; is it too much gasoline or too little gasoline, or sometimes one and sometimes the other?

[The stroke should be 11-32 inch. A disagreeable odor of the exhaust is due to too much gasoline. If there is not sufficient air in the cylinder to burn all the gasoline introduced the latter only burns partially, forming carbon monoxide, a poisonous, ill smelling gas.—ED.]

A Correction.

Editor HORSELESS AGE:

I see on page 767 of a recent issue this item: "An expensive automobile, owned by C. B. McVay, was destroyed by fire," etc. This is evidently copied from the daily press, and as usual in such cases, grossly exaggerated. The facts as stated by Mr. McVay are that his steam carriage was left standing (against his express orders) by his hired man, in front of a village barber shop, where many idle boys congregate. Some of these extinguished the pilot light, but left same turned on, so as to run considerable raw gasoline into sub-burner. On return of the man, he shut off gasoline, but did not wait long enough for all to evaporate before lighting up, and in consequence blistered the paint on body of carriage. That was the extent to which it was "destroyed," and it has not been out of service. R. W. BAILEY.

The Oldsmobile Company of Great Britain, Ltd., has been registered in London with a capital of £3,000 in £1 shares. The object of the company is stated to be to adopt an agreement with F. W. Peckham, and to carry on the business of manufacturers and repairers of and agents for the sale and purchase of automobiles, motor cars, carriages, cycles, etc.

WANTED

Subscribers of the HORSELESS AGE who are willing to solicit subscriptions from their friends on a commission basis.

Address EDITOR HORSELESS AGE.

NEW VEHICLES AND PARTS.

The "American" Gasoline Carriage.

The American Motor Carriage Company are now well established in their new offices and factory, No. 514 East Prospect street, Cleveland, and are making rapid progress on their first lot of machines. They expect to have ten complete rigs out in the next thirty days.

The accompanying cut shows their standard vehicle, which has military wheels, American ball bearings, angle iron frame, semi-elliptical springs, wheel steering gear. The engine of the ordinary single cylinder four-cycle type. Cylinder, 4½x6, develops 5 horse power at 800 revolutions. There are two forward speed clutches and one reverse, all worked by single lever. The throttle is worked by foot button. A float feed carburetor of the Longuemare type furnishes the gasoline mixture. "Autocells" and jump spark furnish the ignition. The spark is varied for different speeds. One notable feature is their automatic check release for starting the engine. The valve is opened and the engine is started by the usual ratchet crank. At the first kick of the engine the compression release valve closes automatically.

The cylinder is water cooled, the circulation being furnished by a small circulating pump. An automatic multiple feed lubricator keeps the various bearings and cylinder well oiled.

With supplies consisting of 6½ gallons of gasoline, 5 gallons of water and 3 pints of lubricating oil, runs of over 150 miles can be made easily without replenishing.

A new two-cylinder model arranged after the French style is being perfected. By that arrangement either tonneau or delivery wagon top may be used on the same frame.

Aside from the gasoline vehicle they are building a light electric runabout, using a battery of their own construction. They have a small charging plant which furnishes the power for all of their electric vehicles. The offices are decidedly unique. The first floor is devoted to the offices of the company; on the second floor is a cozy den where visitors may lounge while waiting. A chef serves lunches to the officers and friends of the company. The remaining part of the second floor is devoted to showrooms, where complete machines and all their parts may be seen at any time. The third floor is devoted to drafting and blue print rooms.

The officers of the company are George F. McKay, president; T. D. Dorman, vice-president and general manager; J. T. Morris, secretary and treasurer; George Dunham, engineer; George H. Wadsworth, superintendent. The capital is $50,000.

The Brennan Chassis.

The accompanying cut represents a running gear fitted with the Brennan standard

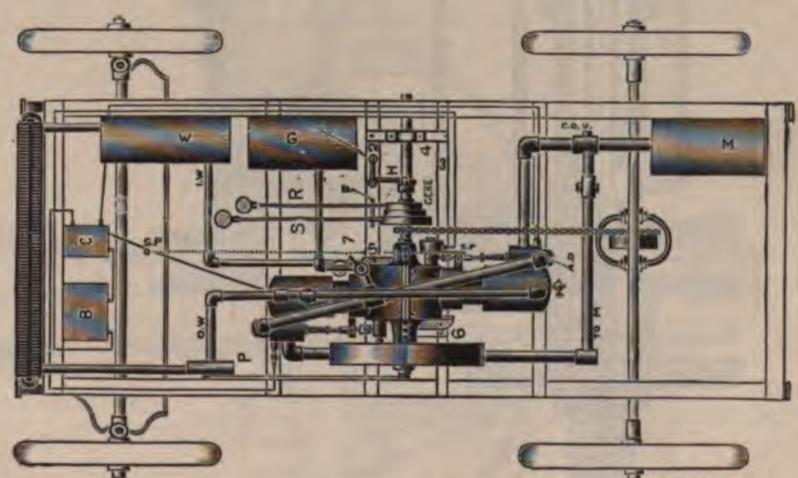
THE AMERICAN GASOLINE CARRIAGE.

water cooled motor and a transmission gear giving two speeds forward. The cut shows the pedals for operating the slow speed and reverse, and the bell crank for the operating of the high speed clutch by means of a hand lever. The two cross ties on the angle iron frame are set far enough apart to allow the lower section of the balance wheel to swing between them. The two cross sections are tied by two flat plates of steel, 3/8x2 inches, for the fastening of the motor, the base of which is provided with four 1/2-inch holes in each side. There is also a third tie of the same dimensions to support the bearing at the outer end of the motor shaft or transmission shaft. The motor is placed on the left-hand side, while the water tank, gasoline tank, muffler and transmission gear are on the right-hand side, and with the operator sitting on the right-hand side the weight is about equally distributed. The battery and coil are placed in front; the short lead on battery goes to the coil; the longest lead follows the angle iron frame to the right down to the rear of transmission gear and connects to the circuit breaker. The ground wire from the coil goes direct to cylinder head of the motor. The two secondary leads from the coil follow the frame, one to the left and one to the coil connecting direct to the spark plugs.

Referring to the water tank and piping, the pipe from the bottom of the tank leads the cooling water to the bottom of the water jacket. The water returns through the piping at the top of the cylinder jacket marked O W to the pump. The pump, driven by chain, forces the water through the radiating coil in front and back to the top of the water tank. The gasoline tank is placed so that the bottom of the tank is slightly above the carburetor or float chamber, and is connected to the float chamber by a small copper pipe. The connection is made by a union, and there is a valve placed underneath the tank to shut off the gasoline to avoid any possible chance of leakage when the vehicle is not in use.

Referring to the piping for water, there should be placed underneath the cylinder, or at the lowest point of piping, a valve for drawing off the water from the cylinder jacket. The water should be drawn off the jackets each night to insure the cleaning out of the scale or dirt that collects in the jacket. There should be a valve close to the water tank to shut off the water from the water jacket, and thus avoid the difficulty of the cylinder walls sweating when not in use.

The piping of the exhaust into the muffler can easily be traced. In the piping is placed a T in place of an L, to allow for the use of two mufflers if desired. The double T shown at C O V allows for the connection of a cut-out valve to the exhaust. The one muffler will be found satisfactory, it is stated, if properly connected.

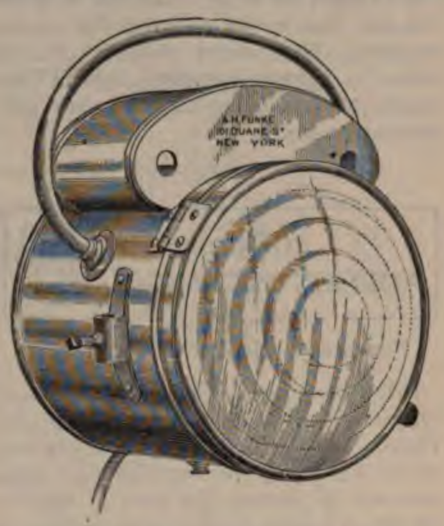


THE BRENNAN CHASSIS.

A New Acetylene Lamp.

A. H. Funke, whose temporary office is at 98 Duane street, New York, has brought out a new acetylene lamp that is said to be capable of throwing a light 400 feet ahead.

The dimensions of the lamp are 11 inches deep and 9 inches in diameter. It



is made of solid spun brass, and has a heavy Fresnal or lighthouse lens. The burner tip uses one foot of gas per hour.

The generator is capable of supplying gas to the lamp for five hours. It is square, in solid brass, of the French type, and is connected with the lamp by a small rubber tube.

The Franklin Carburetor.

The H. H. Franklin Company, of Syracuse, have recently brought out a constant level carburetor claimed to be a new departure. It is especially designed to enable an engine to operate through great ranges of speed and throttle without a change in the quality of the mixture.

They claim that in all float feed carburetors as at present used the mixture grows weaker or stronger as the engine draws less or more air, and therefore the speed of the engine is limited in both di-

rections by its getting too little or too much gasoline. It is also neessary to prime the engine or provide an overflow to get enough gasoline to start it.

To overcome these objections the Franklin Company have provided a compensating feature which produces a condition compelling the percentage of the flow of gasoline to the total flow to grow less and less as the speed of the engine increases. This added amount of fuel keeps the mixture constant. Special provisions are made for cleaning the small gasoline passages.

...OUR... FOREIGN EXCHANGES

Brouhot's Alcohol Carburetor.

Below are shown two views of an alcohol carburetor made by Brouhot & Cie., of Vierzon, France. The alcohol from the supply tank flows to the constant level compartment M through the tube A, and the admission to this compartment is stopped by a needle valve when enough liquid has been admitted, the float B closing the admission passage automatically. From the constant level compartment the alcohol flows to the mixing compartment.

When the exhaust valve of the engine drops back on its seat the valve I follows this motion and descends on its seat just before the lower valve G starts to open. The latter is controlled by the rod J, which is also acted on by the exhaust valve lever at the moment when the exhaust valve is nearly back to its seat, and then the suction stroke begins.

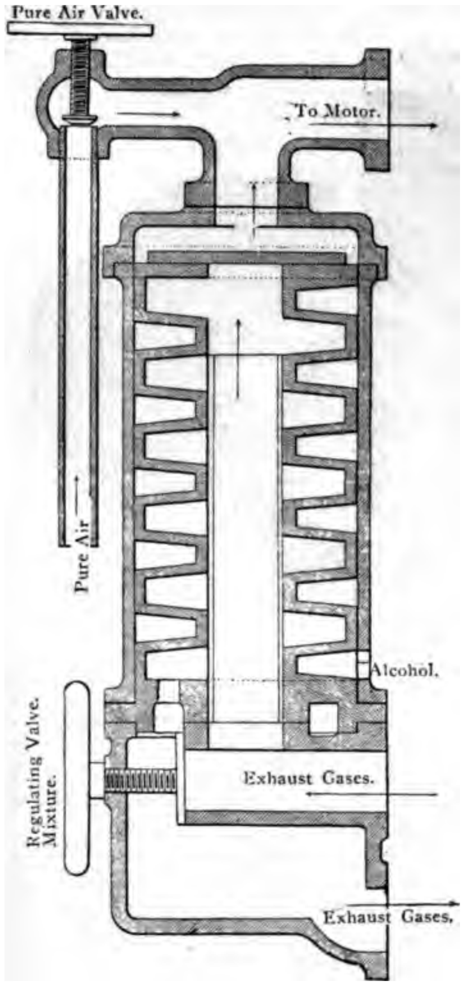


FIG. 2.—BROUHOT VAPORIZER.

The air enters the mixing chamber at K and carries along the alcohol which drops from the cavity E into the lower part of the vaporizer, through the tube H. In its passage through the vaporizer the alcohol, which is already finely sprayed and mixed with the air, is vaporized, and it leaves the vaporizer in the form of a perfect mixture and very hot.

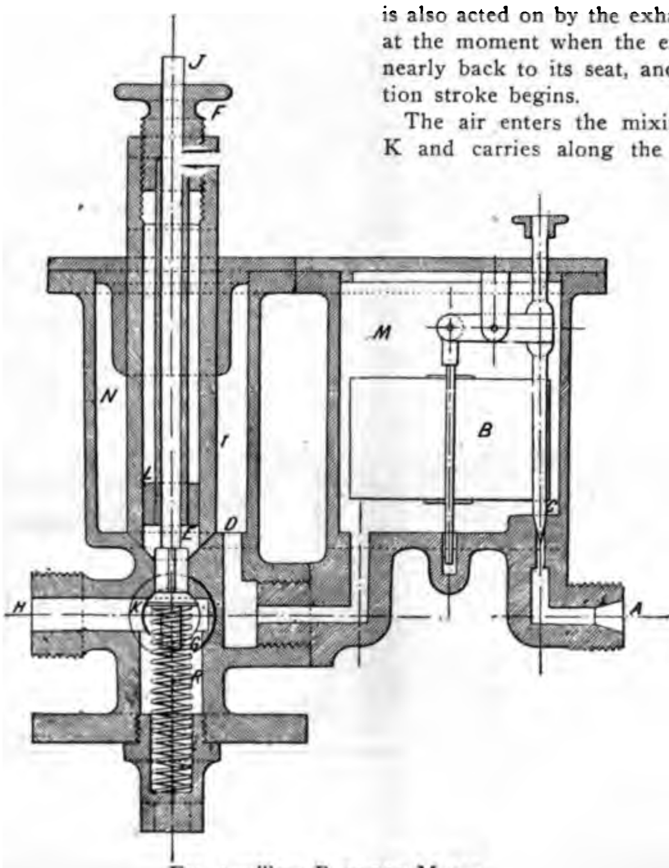
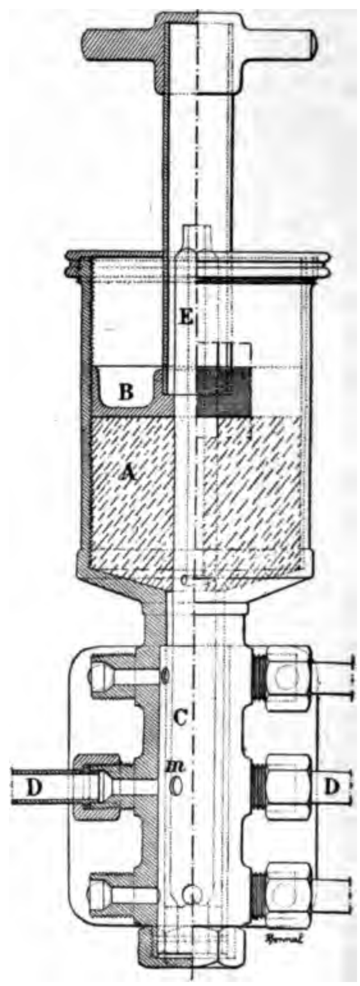


FIG. 1.—THE BROUHOT MIXER.

The vaporizer (Fig. 2) communicates with the intake passage of the motor by a tube connected to it at its upper end. Opposite this tube is arranged a valve through which cold air can be admitted, and thus any temperature excess of the mixture corrected. The vaporizer is kept at a suitable temperature by leading either a part or all of the exhaust products through a helical passage which surrounds the central tube of the vaporizer. The proportion of the exhaust products which pass through this passage is regulated by means of a valve.

Lefebvre's Multiple Feed Compression Grease Cup.

On the Mors vehicles is used a compression grease cup, with six simultaneous feeds, designed by M. Lefebvre. It is used especially for lubricating the gear box bearings. The grease may also be fed to each bearing separately. To this end each of the lubricating tubes is provided with a number. The six numbers are stamped on the lower part of the grease cup, which is capable of turning around



LEFEBVRE'S GREASE CUP.

itself (when the piston handle is turned to the left), and the six numbers may thus be brought successively opposite an arrow on the body of the grease cup.

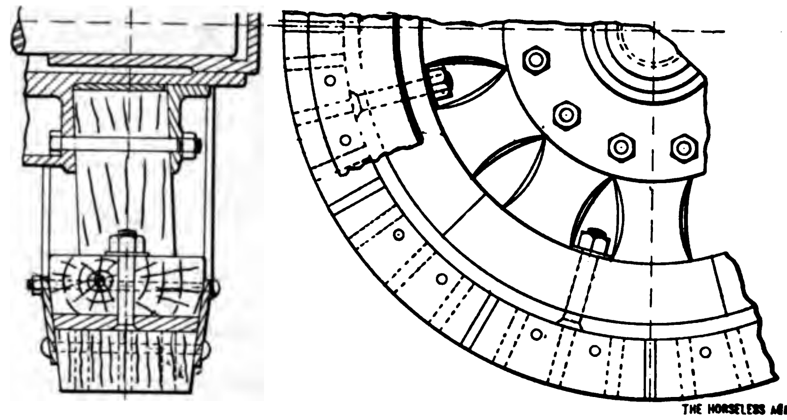
The grease cup is tapped out on its interior, and is partially filled with grease A on which presses a threaded piston B when it descends on being turned by hand to the right. The grease would then be forced into the six feed pipes D if a hollow cylinder C terminating on top in a rod E did not cut off communication with these tubes. The rod E can neither be raised nor lowered; it can only be turned to the left, and it penetrates the hollow rod or stem of the piston as the latter is turned down.

This rod E is only operated by the piston rod when the latter turns to the left. Then it serves to bring the orifices in with which the hollow cylinder is provided opposite the openings of the various feed pipes, the particular pipe into which the grease is fed being indicated by the arrow. The driver may thus provide each of the bearings with just the amount of lubricant it requires.—*From La Locomotion.*

Rear Axle Construction and Brake of Dupressoir.

In light carriages the system of driving axles and chainless transmission is gaining in favor both here and abroad. Fig. 1 below is a section through the rear axle of the Dupressoir carriage made in Maubeuge, France. This carriage has bevel gear transmission and a spur differential gear with ball bearings on both the pinion shaft and the axle and a special ball bearing back of the differential gear to take up the side thrust of the bevel gear drive. The two master gears of the differential are fastened to the squared ends of the half axles. The brake drums are fastened to the hubs of the wheels. The brake lever is pivoted to a bracket projecting from the axle. These brakes are of the double acting type and the operating mechanism is provided with an equalizing device.

The bevel driving gear and the equalizing gear are inclosed in a casing in which the bearing for the driving pinion is supported. When power is transmitted the casing, of course, has a tendency to turn around the axle. The connection with the spring blocks, through the axle sleeves, resists this tendency of the casing, but in order to hold the latter rigidly it is connected by two links to a cross bar on the frame, one link fastening to the casing on top and one below.



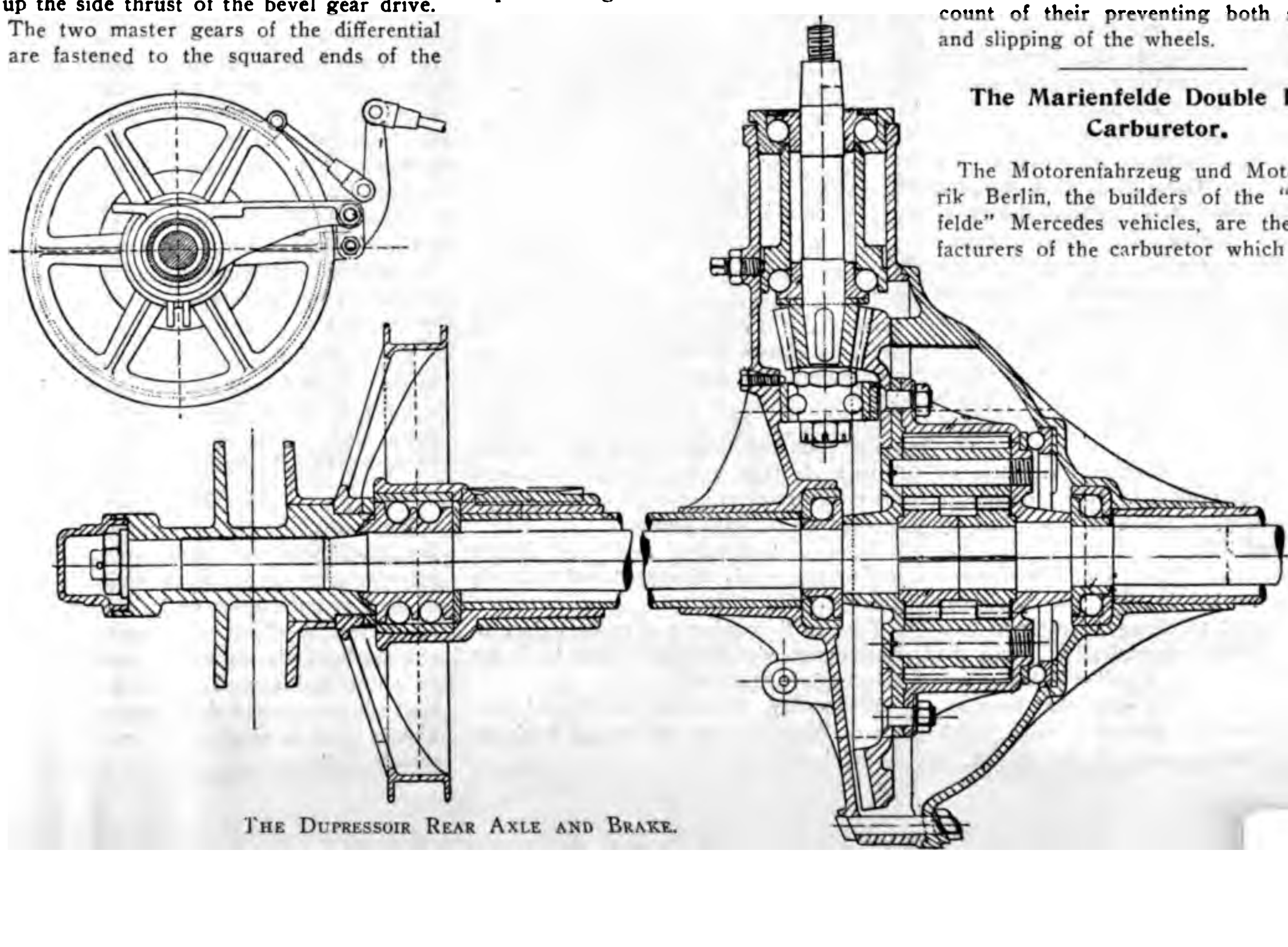
SCOTTE WOOD TIRED TRUCK WHEEL.

Scotte Wood Tired Truck Wheels.

It appears that a considerable number of motor truck manufacturers in Europe are experimenting with wood tires. Below are given some particulars of a wheel, with a tire shod with wood blocks, employed on the Scotte steam tractors. The wheel itself (herewith illustrated) is of ordinary construction, with wood spokes, wood felloes and steel tires. To these steel tires, on the outside, are applied hard wood blocks, held between two steel disks on the sides, being dovetailed in between them as it were. In order to increase the live of these blocks they are drilled full of radial holes, into which steel studs are inserted.

The blocks are entirely independent of the wheels, and can easily be renewed when worn out, i. e., every 3,000 to 4,000 miles run, according to kind of pavement traveled on.

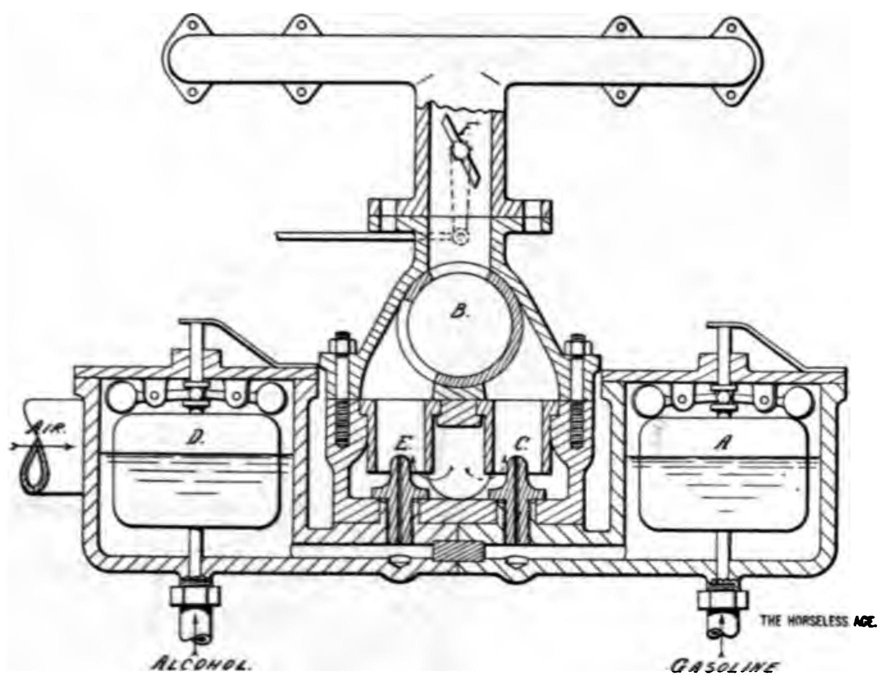
The width of the blocks is considerably larger than the width of tires required by the road authorities for ordinary vehicles, and the wheels perform in a way the office of a road roller, it is said. The Scotte Company have used these tires for several years on their trucks, and claim to have found them entirely satisfactory, especially on account of their preventing both skidding and slipping of the wheels.



THE DUPRESSOIR REAR AXLE AND BRAKE.

The Marienfelde Double Float Carburetor.

The Motorenfahrzeug und Motorenfabrik Berlin, the builders of the "Marienfelde" Mercedes vehicles, are the manufacturers of the carburetor which the ac-



MARIENFELDE DOUBLE FLOAT CARBURETOR.

companying cut illustrates. On the European continent alcohol is used quite extensively in hydrocarbon motors for vehicle propulsion. It would, probably, be employed exclusively for this purpose but for the high price and the fact that it does not vaporize as readily as gasoline.

In some carburetors the alcohol is heated by a flame before starting up. The Marienfelde company employ an auxiliary fuel (gasoline) to start up with. As soon as the motor picks up the feed of gasoline is turned off and that of the alcohol turned on simultaneously by means of a three way mixture valve B. A small reservoir, not shown in the sketch, communicates with the chamber that contains the float A which keeps the gasoline at a constant level. When starting up the three way cock B must be turned so that the air takes its passage as indicated by the dotted arrow. Gasoline is then sprayed from the nozzle C and carried to the cylinders of the engine. The drawing shows four connections which correspond to the number of engine cylinders. When the cock B is turned, as per the drawing, the air passes into the system in the direction of the solid line arrow. Alcohol is now drawn from the chamber in which the float D works and is sprayed by the nozzle.

To control the mixture a throttle or damper F is provided. It is located in the main intake pipe and controlled by an arm and link.

It may be stated here that one German manufacturer has brought out a similar device adapted to change over from gasoline to alcohol automatically. When the engine is started up gasoline is being fed. As soon as a certain speed has been attained a governor operates a valve which turns on the alcohol. If the motor is overloaded and the speed drops below the point to which the governor is set, the gasoline is turned on again, which increases the power.

Rules of the English 1902 Endurance Contest.

We have already referred to the 1902 big trials, as this event is frequently referred to. A preliminary prospectus has just been issued by the A. C. G. B. and I., giving the rules and other particulars about the event, from which the following is condensed:

The committee of organization consists of nine members appointed by the club committee and nine members appointed by the trade. Judges have been appointed as follows: Lieutenant-Colonel Holden, Prof. C. Vernon Boys and Messrs. W. Worby Beaumont, Campbell Muir, Lyons Sampson, S. F. Edge, J. I. Thornycroft, W. H. Astell, H. Austion, J. S. Critchley and Thomas Clarkson. Quite a number of the judges are connected with manufacturing firms, and it is stipulated that they may not judge in classes in which vehicles owned, manufactured or sold by them are entered.

THE ROUTES.

The start and finish of each day's run are to be made daily at the Crystal Palace, and the return route is not to be over the same road as the outward journey.

Monday, September 1—Crystal Palace to Folkestone via Riverhead and back via Sidcup; 136½ miles.

Tuesday September 2—Crystal Palace to Eastbourne via Sevenoaks and back via Edenbridge; 114¼ miles.

Wednesday, September 3—Crystal Palace to Worthing via Epsom and back via Arundel; 119¼ miles.

Thursday, September 4—Crystal Palace to Brighton via Bolney and back via Cuckfield; 93 miles.

Saturday, September 6—Crystal Palace to Tunbridge Wells via Riverhead and back via River Hill, Poll Hill and Westerham Hill; 62 miles.

Friday, September 5—Crystal Palace to Bexhill via Sevenoaks and back via East Grinstead, including speed trial on the "flying kilometre" course; 123½ miles.

Unless a car makes an average of 12 miles per hour on the route to Bexhill it shall not run on the track.

SPECIAL NOTE.

The principle underlying the rules is that the trial is a trial of reliability. There are to be hill climbing trials and a speed trial on a private road. In these speed will be an important factor, but in calculating the marks to be given the cost of the vehicle and the number of passengers carried will also be important factors. Excepting in these hill climbing and special speed trials no advantage, from the point of view of marks, will be obtained by a vehicle which travels at more than 12 miles an hour. Marks will be deducted for all stops other than compulsory stops, stops for traffic or tire troubles.

Speed in excess of that required to gain the maximum marks (viz., 12 miles per hour on the open road and 8 miles per hour or less in traffic) will therefore be useless, except during the hill climbing trials and speed trials. However, in arriving at their final verdict the judges' committee will take into consideration points in connection with the construction and behavior of the vehicles.

The trial is open to tourist cars only. Racing cars will not be admitted. Racing and other cars capable of attaining very high speeds present so great a temptation to drivers to drive at speeds which might well be interpreted as defiance of the law, that they are a danger to the movement in this country, and may be the means of bringing about injuriously restrictive legislation.

The committee reserve to themselves the right to refuse to permit cars to run in the trial which, in their opinion, should not be classed as tourist cars.

RULES.

The trial is open to motor vehicles made in the United Kingdom and abroad. The number of cars of any particular type and horse power, entered by a manufacturer or agent, shall be limited to two.

SECTIONS.

There shall be two sections as follows: Sec. 1.—Motor vehicles, entered by their manufacturers or by the authorized agents of their manufacturers or by private owners. Sec. 2.—Parts of motor vehicles, entered by their inventors, manufacturers or authorized agents, as showing a distinct advance on any similar apparatus previously used in a trial held by the Automobile Club.

CLASSIFICATION.

Sec. 1. shall be divided into eleven classes, viz.:

	Selling Price.	Entrance Fee.
Class A	£150 or less	£10
Class B	200	12
Class C	300	14
Class D	400	16
Class E	500	18
Class F	600	20
Class G	700	22
Class H	800	24
Class J	1,000	26
Class K	1,200	28
Class L	over £1,200	30

Except as regards Class L, unless there are in a class at least three vehicles of different types entered by three different firms, the class shall be abolished and the vehicles shall run in the next higher class.

In Sec. 2, parts, such as ignition devices, governor devices, etc., may be entered, if entered by an inventor, manufacturer or seller, on the ground that such part is a distinct advance on any apparatus having the same purpose which has been previously used in a trial held by the Automobile Club. Entrance fee, £5. Tires may not be entered in this trial.

A competitor in Sections 1 and 2, in entering, shall state the price at which he guarantees to provide to the public exact duplicates of the vehicle or part entered for trial, provided that the order be received before December 1, 1902, with a deposit of one-third of the value.

The persons who enter parts for trial under Sec. 2 shall be required to arrange that they shall be fitted to a motor vehicle, and the club shall not be responsible for the proper running of such vehicle. No certificate shall be given as to the running of a vehicle unless it be entered for the trial.

The part entered under Sec. 2 shall not be changed during the trial, but before starting shall be sealed by the club officials.

Owners shall state on the entry forms the bore and stroke and number of cylinders, and after the trial these measurements shall be checked by the judges at the written request of the owner or at the written request of three competitors.

ENTRIES.

Persons in making an entry thereby agree that in case of a vehicle or part being disqualified, or failing to take part in the trial, the entry fee shall remain the property of the club.

The club shall have the right to refuse any entry without giving a reason.

The entrance fees in Sec. 1 shall be as shown above, if paid not later than 12 noon on Saturday, July 12. After that hour the entrance fees shall be increased 25 per cent. per week. No car can be entered after Saturday, August 2.

In the event of the entry fees and other receipts being in excess of the expenditure in connection with the trial, the surplus shall be proportionately returned to those paying entry fees, provided that the vehicle or part in respect of which the entry was paid takes part in the trial.

OBSERVERS.

Every vehicle in Sec. 1 or Sec. 2 will carry an official observer, for whom a seat must be provided. An observer shall, as far as practicable, ride on a different vehicle every day.

Each competitor must submit to the club committee, on or before Saturday, August 9, the name of a suitable observer for each vehicle entered by him. The observer shall not act as observer on the car of the competitor by whom he is found. The name may be rejected by the club committee.

SPEED.

In order to prevent excess in speeds, vehicles will not be permitted to pass certain points before the expiration of a certain period from the time of passing a previous point, plus the total time occupied by stops from all causes.

Vehicles which arrive before time will, by that fact, become disqualified from continuing the run. The honorary observers will cease to take notes, and no mark will be given for the run.

If a vehicle arrives before time near one of these points, and has to stop in order to wait for the expiration of the period, the stop will be counted an involuntary stop, and marks will be deducted. If a car loses from this cause more than ten marks in a day the car shall not receive its record for the day, and if the same car continues the practice it will be disqualified. Detours made to avoid arriving at a point before time will be accounted as stops, and marks will be deducted accordingly.

Any vehicle making a detour must return to the spot at which it left the route. If a detour is accidental the time lost will not be counted as part of the running time, and marks will not be deducted.

No marks will be given for speed in excess of the legal limit except in the hill trials and the speed trial. A competitor who may be prosecuted at law for excessive speed may, if the club committee are satisfied that unreasonable speeds have been used, be disqualified.

The changing of sprockets for speed trials or hill climbs or at any time during the trial shall not be permitted.

SYSTEM OF MARKING FOR RELIABILITY.

There will be a maximum number of marks for reliability for each day's run, viz., 300, and one mark will be deducted for every minute during which the vehicle is at rest from the time of starting to the conclusion of the run except for—

Three compulsory stops per day for refreshments, viz., one-quarter hour in the morning; luncheon, three-quarter hour; tea, one-quarter hour. The engine must be stopped, and the car may not be adjusted or replenished during the two morning and afternoon stops of one-quarter hour each, but only during the three-quarter hour luncheon interval. These stops may only be made at the specified places indicated in the programme, and cars must not restart after the luncheon interval until the hour specified in the programme.

Traffic.

Tire trouble.

Accidental detours.

Lighting carriage lamps.

The cause, as well as the duration of stops, shall be printed in the official report. There will also be deducted, in addition, one mark for every minute in excess of the official maximum time for the run, the time occupied by all stops having first been added. The official maximum time will be the time which would be occupied by a vehicle in traversing the trial route at the maximum legal speed plus the extra time occupied in controls and dangerous zones.

Example: A run of 110 miles at 10 miles per hour = 11 hours.

This run includes 10 miles of controls in which the speed must not exceed 8 miles an hour.

The time in traversing these controls instead of being 1 hour (i. e., at 10 miles per hour) would be (at 8 miles per hour) 1 hour 15 minutes.

Therefore the official maximum time for the 110 miles would be 11 hours 15 minutes.

The maximum has involuntary stops on the journey amounting to fifteen minutes.

Owing to slowness it occupies on the journey (including the fifteen minutes' stop) twelve hours.

It should not have occupied more than the official maximum of 11 hours 15 minutes + 15 minutes for stops.

Therefore it has not kept up to the official time, but is in excess by thirty minutes. Its marks therefore would be 300
less 15 and 30 = 45

Total.. 255

Stops for punctures, traffic or compulsory stops for refreshments are added to the maximum official time, but not represented by marks deducted. Five marks will be deducted from the marks for reliability for every stop for tire trouble.

[Here follow the rules for marking in the hill climbing contest which were given in our issue of May 14 last.—Ed.]

BRAKES.

The judges' committee will hold special tests on Saturday, August 30, and at other times to ascertain whether the trial vehicles are fitted with sufficient brake power, and specially whether the brakes are so constructed that they will prevent the vehicle from running backward if stopped on a steep up-gradient. Marks will be deducted in accordance with the inefficiency of the brakes.

PASSENGERS.

All motor vehicles in Sec. 1 shall carry their full complement of passengers. The number of passengers or equivalent weight carried will be mentioned on the certificate, and will be taken into account in judging awards.

Such persons shall weigh together at the

rate of not less than 10½ stone per person, or the deficiency or absence of a person may be made up by ballast, but such ballast shall not be tools, parts or accessories.

SEATS FOR PASSENGERS.

Passengers must be provided with seats conveniently and with comfort. Cars shall carry their full complement of passengers, and if extra passengers are carried for which proper seats are not provided, such passengers shall not count in favor of the car.

The person or persons by whom the vehicle is entered for the trial, and not the club, shall be responsible for the provision of passengers or ballast, and the officials of the club may at any time require the persons and ballast to be weighed, and if they do not suffice to satisfy this rule, the car may be disqualified, and may receive no certificate or mention in the records.

Any alteration, temporary or otherwise, in the load or the number of passengers during a hill climbing trial shall be declared by the driver and noted by the observer.

Seats for certain portions of the journey may be placed at the disposal of the club, by giving notice in writing to the club secretary not later than August 23, 1902. The club shall use its best endeavors to provide as far as possible that press representatives shall occupy such seats. On or before August 30 it shall advise the owner of vehicles who may have placed seats at its disposal, if the club can or cannot make use of them for press representatives, and if the club shall state that it cannot so use the seats the owner shall be required to see that the above rule is complied with.

DRIVERS AND MECHANICS.

A vehicle shall be driven by the same person throughout a day's run, unless he be incapacitated, when his place may be taken by a substitute, on notice being given to the observer. A vehicle in Section 1 shall only carry one acting mechanic in addition to the driver, and no other persons (except their substitutes) shall take part in the replenishing of fuel, lubrication, adjustment, repairs, etc.

AWARDS.

The committee of the club will give the medals on the recommendations received from the judges' committee appointed by the Automobile Club:

Section 1—Gold and silver medals, as first and second prizes in each class.

Section 2—Parts; gold and silver medals.

The medals will not be awarded unless recommendations are made to the effect that vehicles or parts are worthy to receive them.

The awards will be made by adding together the marks gained by each car during the trial for: (a) reliability (rule 29); (b) hill climbing; (c) speed on private track (marks = speed in miles per hour × 10); (d) horse power and weight; (e) steering gear; (f) brakes; (g) condition of car at the end of the trial.

The marks for horse power, as shown by performance in proportion to the weight and to the number of passengers carried, shall be arrived at by the following formula:

$$\frac{\text{Horse power as shown by performance} \times 100 \times \text{the number of passengers carried}}{\text{Weight in cwts. (without passengers).}}$$

Marks may be deducted to any extent by judges, or the car may be disqualified if, in the opinion of the judges, the steering gear or brakes are insufficient in design or material. Maximum marks for steering gear = 250. Maximum marks for brakes = 250.

If a car has been driven before the trial the driver may call the attention of the judges to any worn parts before the trial. The maximum marks allotted in respect of the condition of the car after the trial shall be 500, and marks shall be deducted by the judges' committee for parts replaced, and a list of parts replaced in each car shall be published in the report.

CERTIFICATES.

Certificates will only be given in respect of vehicles which have made an average of not less than 10 miles per hour on the total trials, after deducting loss of time in controls, by tire troubles and by compulsory stops.

The competitors shall not publish, or communicate for publication, any other times than those contained in the club certificates.

A competitor, by entering, thereby undertakes that in the event of subsequent alterations by the club of the records on the certificates, owing to protest or other cause, he will only publish the records as thus amended.

The observers' record sheets are the property of the club. Their contents shall not be shown or communicated by an observer or a competitor to any person except a club steward or official, neither shall any copy be made by the competitor, and he shall not permit anyone to make a copy of the records.

The club will give certificates to drivers of motor vehicles who may successfully and properly drive a vehicle throughout the trial, provided that the vehicle shall successfully accomplish the trial.

DATE OF ARRIVAL OF VEHICLES AT THE CRYSTAL PALACE.

Competing vehicles shall be at the Crystal Palace, Sydenham, on Friday morning, August 29, at 12 noon, otherwise they shall be disqualified. The vehicle will then be marked by the judges' committee. From that time no part must be replaced until after the judges have examined the vehicle after the trial, unless notice in writing of such change be delivered to the observer or to the club secretary or his deputy within twelve hours of the change being made. Infringement of this rule shall entail disqualification.

Competing vehicles shall be displayed daily in the Crystal Palace from the conclusion of the run, and shall remain there every night.

STARTS AND STOPS.

On running days the start from outside the Crystal Palace will take place at 8 a. m. precisely. Vehicles will be started from outside the Crystal Palace in order of numbers, which will be secured by drawing lots for each day. The drawing of lots will take place at the Crystal Palace on Saturday, August 30, at 12 noon, on the first day (Monday, September 1), in sections, and in the order in which they are entered. First, Section 1, Classes A, B, C, D and E. Then Section 2. The vehicles will keep that order to the outward control, where they will be restarted in the same order at twenty second intervals.

Any vehicle which is not ready to start from outside the Crystal Palace by 8 will lose one mark per minute from 8 a. m. until it starts. Involuntary stops between the Crystal Palace and the outward control of London and the inward control of London and the Crystal Palace will result in the deduction of one mark per minute. If a vehicle does not start from a control, etc., when officially started, it will lose one mark per minute until it actually does start.

CLEANING AND REPAIRS.

No vehicle shall leave the Crystal Palace to go to the rank before 7.30, or without the official observer being on board. From the time of the arrival of a vehicle in the Crystal Palace at the end of a run, the vehicle must not be touched except to dust the carriage work, and clean and replenish the carriage lamps, except during the time allowed for washing, replenishing, etc.

On the evening of every running day when the vehicles arrive at the Crystal Palace, they must be driven direct to the cleaning inclosure. Two men shall be allowed for each car for washing and preparation, and there will be no restriction as to what portion of the work shall be carried out at night or in the morning, provided the total time does not exceed two hours and not more than one hour is reserved for the morning.

If the total allowance of two hours has not been absorbed over night before the beginning of each day's run, a vehicle will be allowed not more than one hour commencing not earlier than 6 a. m., and not later than 7 a. m.) for replenishing fuel, lubricating, and adjustment. One mark will be deducted for every minute occupied in replenishing fuel, oiling, lubricating, or adjustment in excess of the total allowance of two hours. If a part be replaced the driver must so inform the club secretary in writing under pain of disqualification. The club will endeavor to make arrangements for fuel to be supplied in the cleaning inclosure.

Sparking plugs may be changed during the time allowed for cleaning and repairing, and it shall not be necessary for a driver to give notice of the change.

Tires, unless they are specially entered for trial, may be changed during the time

allowed for washing and preparation, but it shall be necessary to notify of the change. No marks will be deducted, and the the change will not be taken into consideration by the judges.

The vehicles must remain in the Crystal Palace after the trial, for examination by the judges, and must not be removed without authority.

CONTROLS.

Every town and village through which the route may pass shall be a control, and unless otherwise stated in the route directions, shall be deemed to commence at the first house of such town or village adjacent to the route, and to similarly end at the last house of such town or village adjacent to the route.

On arriving at a stopping place a vehicle shall be driven to take its place immediately behind the vehicle in front of it, and shall be driven as near as possible to the near side of the road, and must on no account be allowed to break rank or drive alongside of another vehicle or otherwise to impede other traffic. Non-compliance with this regulation shall subject the vehicle to disqualification. Any vehicle which may take up its wrong position in a rank may be immediately disqualified.

The observer should point out to the driver of the vehicle the correct route of the trial.

The carrying, during a trial run, of spare outer covers of pneumatic tires, so attached to a motor vehicle as to be within sight of the public, is prohibited.

SIGNS AND NUMBERS.

No vehicle or part shall bear a sign or other indication of the maker's name, except the small plates which are usually attached to the vehicles sold to private owners.

Every motor carriage shall bear a metal plate on the front and a plate at the back. Such plates each to measure 8 inches square, and to have painted on them the official number of the vehicle or part. These number plates, with numbers thereon, may be obtained at the Automobile Club (free) between Monday, 18th, and Thursday, 28th August.

The King's Motor Expert Fined.

A London daily publishes the following: "Mr. Stanton appeared at Hailsham police court on Wednesday. He was timed over two measured furlongs by a policeman in thirty-two seconds, making a speed of over 28 miles an hour. Mr. Stanton admitted that he was traveling at more than 12 miles an hour, but asked to see the sergeant's stop watch. It was an ancient, well worn, silver cased timepiece. 'Ah!' said Mr. Stanton, handing the watch back. 'I'd not like to say anything about it; I was taught always to be respectful to poor old things. Age is against it. Why, I'd hate to be hanged even by a watch like that!' The magistrates joined heartily in the ensuing laughter. Mr. Stanton obtained from the police that he stopped his car immediately. That, he said, was his point. He had his car absolutely under control. The bench would no doubt gather that he understood something of the management of motor cars and how to drive them safely if he mentioned that he was motor expert to the King. He first interested His Majesty in motor cars by taking him out and showing what they would do. He had made a special point of studying the care of cars upon roads, the sort of points to steady speed at, and even the sort of horses to stop for. Mr. Stanton complained that the police who 'timed' him, while engaged catching motorists on a downhill course, entirely overlooked a couple of men with wagons blocking up and making the road dangerous while they quarreled. He had to drive on to the grass to get past them. In the result Mr. Stanton was fined £1 and costs, some absent defendants being fined £2 each and costs."

The "master of the King's motor cars," Grahame White, also recently made himself guilty of furious driving and had to make an apology to the Automobile Club, the offense having occurred in connection with a club event.

It would seem that some of the members of the King's motor staff are under the impression that by reason of their position they are beyond the automobile speed laws, which experience, however, has shown to be incorrect.

The technical committee of the A. C. F. has decided to organize trials for automobiles for city and suburban use next October.

Madame Lockert, of Paris, the proprietress of an automobile journal, has found the automobile useful for moving van purposes.

The Automobile Club of France appointed Messrs. Jeantaud and Forestier to represent it at the Montauban Congress for the Advancement of Science.

The entries for Paris-Vienna reached 208 in the racing and sixty-four in the touring section. The starters in the two sections numbered 137 and forty-nine respectively.

The Automobile Club of Frankfort, Germany, has decided to bear the legal expenses of an appeal in case a member has been unjustly prosecuted by the police authorities.

A detail improvement which has lately been effected in the engines of Napier cars is an arrangement to insure that the correct amount of oil is always in the crank chamber. Many motorists find much difficulty in judging as to how much oil there should be in the chamber, and great damage is done to engines through insufficient oil. By the new arrangement it is only necessary to fill the chamber until the oil begins to run out of the overflow pipe.

In Russia steam automobiles seem to be in favor. No less than eleven Serpollet machines are in use by members of the St. Petersburg court, and American steam carriages are also being introduced.

Fournier made a run over the Paris-Vienna route a short time before the race and reported that the Arlberg in Austria was covered with snow. Peasants were then engaged in clearing the road.

The Spanish Ministry of War has instructed the Comandancia de Ingenieros at Mahon to make some experiments with motor cars, and, as a first step, have authorized the purchase of a 6½ horse power Darracq tonneau.

An automobile exhibition will be held at Leipsic, Germany, October 18-27 next. Among the firms that have taken space are said to be the representatives of Panhard & Levassor and the Locomobile Company of America.

J. Pennell, an English motor bicycle enthusiast, writes that he has just finished a trip of at least 2,000 miles on a motor bicycle, from London to St. Remo, Pisa, Florence, and back to Havre. He adds that he rode all the way except part of Mt. Cenis.

The Indian princes who went to London for the coronation were entertained by a number of automobilists on June 22 by being driven from the St. Ermins Hotel to Hampton and back. It is said they were delighted with the novel experience.

The Prussian military authorities are taking a census of automobiles at present. The owner of the vehicle must state its power and price, his age, and whether in case of war he may have the vehicle brought to a designated place by an experienced man.

The London County Council has just sealed a contract with Messrs. Merryweather & Sons for the supply of six new steam fire engines for the Metropolitan Fire Brigade. Each of these will be of the double-cylinder vertical type, with expansion gear and oil burning arrangements of the latest pattern.

The Irish Automobile Club will hold its annual tour July 19 to 28, from Dublin to Connemara and the Mayo Highlands. As many members do not care to drive long distances every day, it has been arranged to remain in Connemara from July 19 until the morning of July 25, and at Mullaranny or Westport from July 25 to July 28. Those taking part in the tour

can then please themselves as regards the length of each day's journey, or can spend part of their time fishing or boating, if they so desire.

Baron Henri de Rothschild was the last to enter the racing section of the Paris-Vienna event and was therefore the last to start. The baron, who is a physician, had his vehicle well stocked with surgical instruments, etc., and the vehicle carried a red cross.

The "Chambre Syndicale des Chauffeurs, Conducteurs, Mécaniciens et Automobilistes" has been holding at the Bourse du Travail, Paris, competitive examinations in the theory of boilers, steam engines, practical applications of electricity and automobiles.

The question of covering the roads with tar is being revived in France. Kerosene, which is successfully used in California, is out of the question for this purpose in France, where it costs about ten times as much. Coal tar costs $5 per ton and the expense of tarring the road is estimated to be $60 per kilometre.

On a recent Sunday the Rev. Dr. Leigh, dean of Hereford, preached in Hereford Cathedral in the morning and had to preach at the cathedral at Worcester in the evening. He made the trip in a voiturette, starting at 3 p. m. and arriving at his destination in time for the commencement of the service.

The King of the Belgians is sojourning at Ostend at present, and the police there have received instructions that the royal automobile, 301—E, shall be allowed to go anywhere, even through the Rue de la Chapelle, which is closed to all other automobilists on account of its narrowness.

The one mile (with flying start) motor cycle record was on the 19th ult. beaten by 9 3-5 seconds in 1 minute 25 4-5 seconds by H. Martin, of the Queen's C. C., on the Crystal Palace track. On the same track, on the 21st ult., Martin also made a successful attempt on the 5 miles flying start motor cycle record of 8 minutes 34 1-5 seconds, held by J. Wright, of Coventry. His time for the 5 miles was 7 minutes 25 3-5 seconds.

The defective welding of wrought iron boiler tubes was recently proved by D. Woodman, of New York, by laying sections of each kind of tubes in 10 per cent. sulphuric acid. The good tubes were attacked uniformly all round, the line of the weld showing merely by its color. The other tubes, however, were eaten away on the line of the weld very rapidly, so that a deep slit was formed there. This indicated that the metal along the weld was porous and open; in other words, that the weld was imperfect. In automobile boilers wrought welded iron tubes are never used, we believe.

To secure the patronage of the members of the Automobile Mutual Protection Association the promoter of the Agricultural Hall Show has agreed to pay a large sum of money (£1,000, it is said) to the association, and to let space to the members at a discount of 15 per cent.

In May last 394 automobiles and motor cycles were imported into England, valued at £93,537, and twenty-one of these vehicles, valued at £6,351, were reshipped. During the first five months of the year 1,400 automobiles and motor cyles were imported, and 123 automobiles and motor cycles of English manufacture exported.

The *Jewelers' Review* gives the following recipe for a liquid bronze paint: "The cases must, of course, be unvarnished. To prepare the liquid, dissolve by gentle heat 5 parts aniline purple and 10 parts aniline red in 100 parts alcohol; now add 5 parts benzoic acid and boil for five or ten minutes. When cool, apply with a camel's hair brush."

The following is a good method for painting aluminium surfaces so that the paint after a certain time does not scale off: (1) Scrub and clean the aluminium surface well with a hard brush in a strong solution of soda; (2) dry the wet aluminium in some hot place; (3) when thoroughly dry, put on varnish, and bake aluminium in an oven for about half an hour to a temperature not exceeding 300° C.; (4) remove aluminium from oven, whereupon it may be covered with any color of paint without fear of its scaling off.—*English Mechanic.*

The A. C. G. B. and I. are complaining about the indiscretion of journalists, in regard to speed attained when they are taken out by motorists, and it is proposed to put a stop to it. In reply to a note on this subject in "Notes and Notices" a journalist writes:

"During the last few years journalists have endeavored to set a high standard of accuracy in reports, and if a writer is invited for a run on a car, and that car travels at a speed of, say, 40 miles an hour, surely he should be allowed to say so. Why not let the public know that cars are capable of traveling at 30 or more miles an hour? I am afraid that the phrase 'up to the legal limit' has become possessed of a meaning never originally intended, and the sooner it is dropped the better. For, when I hear of a man driving 'up to the legal limit' I always have visions of about 2 miles in three minutes—and so have most of the public."

MINOR MENTION

The Hamilton, Ont., city fathers are struggling with an auto ordinance.

The Winchester (Ohio) automobile factory is said to have completed its first automobile.

The Auto Vehicle Company, capital $15,000, has been incorporated under New Jersey laws.

C. W. Ware has opened a branch of the Harvard Auto Station system at 34 Winthrop street, Salem, Mass.

The Park Board of Denver, Col., are seriously considering the advisability of barring autos from their domains.

E. J. Wilcox and others, Pueblo, Col., are said to be interested in the introduction of an automobile line running to Bessemer, a suburb.

It is reported that the Morgan Motor Company, Worcester, Mass., have petitioned the Automobile Club of America to organize a motor truck contest.

The chauffeur of A. F. Vanderbilt, Newport, R. I., was recently arrested and fined $12.60 for fast driving and warned that imprisonment would be the penalty for a second offense.

D. Thorpe Munroe, New Haven, Conn., who while riding a bicycle June 10 was struck by an automobile operated by Harry W. Dupuy, a Yale student, died of his injuries July 6.

The Badger Brass Manufacturing Company, of Kenosha, Wis., have taken up the manufacture of auto horns, and will exhibit at the next automobile show a full line of "Solar" horns.

A traveling salesman for the Independent Whip Company, Westfield, Mass., whose territory lies in Iowa and Missouri, is employing a steam carriage of his own construction in making his calls.

Insurance policies for automobiles, covering risks from fire and in transportation by rail and water, are issued by the Boston Insurance Company. Risks from fire due to *external* causes are included only.

The Victor Engine and Motor Carriage Company has been incorporated at San Francisco, Cal., with $100,000 capital stock by George E. Hoyt, Charles N. Champion, Charles F. Thompson, Adolph Lorsbach and Walter Rosie.

Sharon D. Barber has bought out the Auto Inn, Merrick road, Valley Stream, L. I., succeeding "Billy Smith." The inn is 18 miles from Long Island City and 6 miles from Far Rockaway. All kinds of auto supplies are kept in store.

Charles D. Shain, 11 Broadway, New York, sends us a sample of an "auto wire terminal" which he is placing on the market. It is a copper stamping, to which the igniter connection wire is to be soldered. Those who have been annoyed by loose

ıd poor connections will appreciate ntages of such terminals.

Buffalo Automobile Club is looking itable clubhouse.

Haven automobilists are opposing ıance restricting the use of automothe parks.

Alamo Manufacturing Company, e, Mich., have christened their new power gasoline runabout the Ala-

ıy & Co., the well known New York ı, are reported to have ordered egant electric wagons for delivery s.

ıs B. Bartleson, a traveling salesr the Southerland-Bartleson Grompany, Concordia, Kan., has bought mobile in which to make his rounds.

Simpson, of New York, and W. C. ı, of Roxbury, Mass., were remed $112.86, besides counsel fees, in ice court at Hartford for violation automobile speed law.

ınder Fisher, 239 West Fiftieth New York, has formed the Amerorges Richard Company to market machines of this make. Mr. is president of the company.

·man Honore Palmer, whose ato run by automobile from Chicago ton was widely heralded by the bandoned the journey at Cleveland equence of the muddy condition of ds.

Kansas City Automobile Club has rganized by the election of the folofficers: D. F. Diazzeh, president; Wittman, vice president; W. L. De ntaine, secretary, and E. P. Morieasurer.

reported that the United States ortation Company, of Philadelphia, nounced its intention to dispose of horses and mules and put in their ifty electric automobiles, including nd heavy vehicles.

Detroit Automobile Club has been rated by W. C. McMillan, Philip Millan, Russell A. Alger, Jr.; Hugo r, C. A. Ducharme, W. H. Burten-Gilbert W. Lee, D. M. Ferry, Jr.; B. Joy and Fred Alger.

C. McCan, an automobile expert. as studied the industry in Europe eral years past, is reported about to sh a factory at 58, 60 and 62 Broad-Buffalo, for the production of gasoıd combination vehicles at a popuce.

second warrant for violation of the ınd automobile ordinance was issued eek, when L. P. Mooers, superint of the Peerless Manufacturing ıny, was arrested on complaint of iver Reese, a member of the Cleveutomobile Club.

ıe Fourth of July run of the Bridgeutomobile Club, the fourteen vehitered all completed the course of 50 without accident. Four machines were disqualified for returning ahead of time, the city and county speed regulations of Connecticut having been imposed on the contestants by the club.

The automobile ordinance adopted by the Union (N. J.) township committee provides that any person "seeing a violation and giving evidence which shall secure a conviction shall receive half of the fine." The fine is to be $50. In addition to the fine, imprisonment for five days may be added to the sentence.

The Automobile Transportation Company of Porto Rico have fitted up three stations, one at San Juan, another at Ponce, and a third at Coyey. At present, owing to the floods throughout the island, the carriages only run as far as Juana Diaz, where they connect with a line of coaches for Ponce. The temporary wooden bridge at Caguas was carried away by the floods recently, and delayed traffic for a time.

It is rumored in the daily press that the Electric Vehicle Company will undertake the manufacture of Panhard vehicles in this country. Two Panhards were brought over by the company's Paris agent several months ago, and since then, it is stated, five machines have been built here after these models. It is not said that any arrangements have been made to secure a license from the Panhard Company.

Residents of Arverne-by-the-Sea, a New York suburban resort, are asking an injunction to restrain the Arverne Automobile Club from erecting a clubhouse and storage station in the centre of the town, contending that, as the plans provide for storage facilities for 100 automobiles, the building would violate the restrictions under which the property is leased, namely, that none of it should be used for stables or stores.

The Diamond Automobile Company, Wilmington, Del., will manufacture a gasoline automobile and a power tricycle, to seat two persons. A new compensating gear, invented by John H. Parsons, will be employed. The directors of the company are James Baily, C. B. Harris and John H. Parsons, of Wilmington; Charles Burton, of Philadelphia; W. F. Pierce, of St. Paul, Minn., and Martin Mainogue, of Springfield, Ohio.

At a recent meeting of the Milwaukee Club the subject of appealing to the common council for the passage of a liberal automobile ordinance was discussed, the opinion being general that unless some steps were taken the aldermen would pass an ordinance that would be objectionable. The following committees were appointed: On legislation, W. H. Starkweather, E. W. Olds, R. C. Forrer; on racing, Thomas Jones, A. E. Wait, Charles L. Haase, Jr.; G. L. Odenbrett and N. C. Norton. Eight new members joined the club, W. H. Starkweather, Dr. Williamson, E. W. Olds, Joseph Fehrer, Chas. Milzer, John L. Kunz and George L. Odenbrett. The next meeting will be held the last Thursday in July.

Ball Bearing Litigation.

The Ball Bearing Company of Massachusetts, located in Philadelphia, has received notice of infringement from the Ball Bearing Company of Maine. The former company, it is claimed, is a licensee, by assignment, of the latter, but failed to live up to the terms of the license contract.

In reply to the notice of infringement sent by the Ball Bearing Company of Maine to the Ball Bearing Company (of Philadelphia), the latter state that they are not in any manner, shape or form infringing any patents claimed by the former, and guarantee to protect their customers against all suits for infringement on any products furnished by them.

Police Traps on the Merrick Road, L. I.

According to a report from Freeport, L. I., District Attorney James P. Niemann has begun to enforce the speed limit in that vicinity. On the Merrick road a quarter of a mile stretch was laid off and policemen stationed at either end. When a vehicle went across the line a signal was given by the policeman at that point, and at the other end the time was taken. If the vehicle arrived at the finish line at a rate of speed that showed it was traveling at more than 8 miles an hour, it was halted and the driver arrested.

Seven arrests were made on Sunday, July 6, mostly of motor cyclists. A police justice was on hand, and court was held. Two of the accused pleaded not guilty and were held in bail for trial at a future date. The others pleaded guilty and were fined from $5 to $15.

The crusade will be continued, it is said, and automobilists are cautioned to observe the 8 mile limit in Freeport.

In East Moriches, L. I., there has also been considerable friction between scorching chauffeurs and the authorities, and the following notice has just been published:

"A reward of $50 will be paid for evidence that will lead to the conviction of any violation of the law regarding the speed limit of automobiles on public roads in town of Brookhaven."

An improvement is said to be noticeable already, and it is thought that the warning will be sufficient and no severe measures will be required to prevent undue speeding in the future.

The first case of a horse being actually frightened to death by an automobile is reported from California. At a small place called Corning, in Tehama County, the other day a horse saw a locomobile for the first time and showed signs of fright. The driver got out of the buggy and grasped the animal by the bit. As the steam vehicle approached the horse reared a few times and then fell over dead —of heart disease, it is supposed.

The Krieger Patents in the United States.

We note in an electrical contemporary that Joseph Hoadley, of New York, according to a report from Paris, "has just purchased for $10,000 a 75 horse power Krieger electric automobile, which recently made the world's record for this class of machine. It is capable of doing 50 miles an hour and is fitted with a new Fulmen battery, of which Mr. Hoadley has purchased the patents for the United States."

It will be remembered that Mr. Hoadley was connected with the promotion of the $7,000,000 Autotruck Company scheme in New York. Investors will also do well to note that the Fulmen battery is a Faure battery, which construction is covered in this country by the Brush patents repeatedly sustained by the courts.

United States Imports and Exports of Automobiles.

Before June 30, 1901, automobiles were classed as machinery by the United States customs authorities, and no figures are available regarding automobile exports and imports prior to that date. During the fiscal year ending June 30 218 automobiles were imported, with an aggregate value of $506,542, according to the official figures. At 45 per cent. ad valorem the duty on these machines amounted to $227,-943.

The exports of automobiles from the United States greatly exceed in value the imports. During the eleven months ending May 31 automobiles and parts were exported from this country valued at $599,-927, or nearly $100,000 more exports in eleven months than imports in twelve.

The number of machines exported cannot be given, because many are sent away in parts. In the imports the French makes predominate by a large percentage, while those exported are mainly steam and electric machines. England takes the majority of the American carriages, while a large number of steam carriages go to South American and to the British provinces.

Steam Vehicle Company of America a Bankrupt.

Another steam vehicle company has quickly followed the Milwaukee and the Dayton into insolvency. Rumors that the Steam Vehicle Company of America, of New York city, was in difficulties had been current for some time when last week an attachment for $15,000 was taken out against the company by the Corbin Banking Company, of New York, on a note for that amount, payable on demand, and news came from Reading, Pa., where the factory is located, that on June 28 the concern had been adjudged a bankrupt in the local courts. C. H. Ruhl, Reading, has been appointed referee, and a hearing will be had before him on July 14.

No estimate of the assets and liabilities has yet been given out. The company was incorporated in March, 1900, with a capital stock of $250,000, Irvin D. Lengel, of Reading, the inventor of the machine, having contributed his factory in return for stock of the company.

Hearing of the Committee of Fifty Postponed.

The law committee of the board of aldermen desired to hear the committee of fifty with regard to the proposed ordinance introduced by Alderman Oatman, and the amendments of President Cantor and Alderman Parsons, and on June 26 notified one or more members of the committee of fifty that the hearing was set for the following day. Horace E. Parker, seretary of the committee of fifty, objected to the short notice given, informing Mr. Armitage, the chairman of the law committee, that most of the members were away and could not attend unless longer time was given, Mr. Parker suggesting the following week for the meeting. It was then decided to let the matter rest until the fall.

The Philadelphia Speed Ordinance.

It is reported in Philadelphia papers that an attempt was to be made by the railroad interests to defeat the bill fixing speed limits for automobiles at 15, 10 and 8 miles by the offering of an amendment to reduce the speed limit to 5 miles an hour within the congested portion of the city, and 8 miles elsewhere in the city limits.

At a meeting of the board of directors of the Road Drivers' Association a resolution was passed protesting against the passage of "the ordinance introduced in councils to reduce the speed of automobiles." A committee was appointed to place the resolution before the mayor and councils.

Quite an argument was precipitated over the resolution. The horsemen declared that the speed of the automobiles did not affect them.

The bill came up before the Select Council on Thursday, July 3. Mr. Trainor vigorously opposed the provisions which allowed the vehicles to move at a speed of 10 miles an hour in certain districts, and offered an amendment to make the limit 8 miles instead of 10. After a sharp debate, in which a number of members denounced the plan of permitting automobiles to go faster than trolley cars, the amendment was adopted by the narrow margin of 18 to 17. Mr. Trainor then offered another amendment to reduce the outside maximum from 15 to 10 miles an hour, but the vote on that was just the reverse of the other, being 18 to 17 against the amendment.

KEROSENE NUMBER, JUNE 28th,
Price Ten Cents.

Races at Cleveland and Detroit.

An automobile meet has been proposed for Cleveland some time in September and the committee in charge, composed of Chas. B. Shanks, Geo. Collister and Windsor T. White, are now at work on the details. It is planned also to have a two days' meet at Detroit, in connection with the Cleveland race, and some of the proposed races are as follows: Five mile, open to all, motor bicycles; 2 mile, open to all, motor tricycles; 5 mile, open to all machines weighing less than 1,000 pounds, except bicycles and tricycles; 10 mile, open to all machines weighing less than 2,000 pounds; 1 mile, open to all steam machines; 1 mile, open to all electric machines; 1 mile, open to all machines for the circular track record; 5 mile, open to all touring cars weighing less than 2,500 pounds, carrying four passengers; 25 mile, open to all machines.

A New Flux.

In using a flux, as is necessary when welding steel or iron and steel, it is oftentimes difficult to keep the flux in place on account of its quickly melting and running off the weld. M. J. Lafitte, Paris, France, has devised a flux consisting of a borax mixture in which is incorporated a fine wire netting to hold it together. It is rolled out in thin sheets and divided into squares which are easily broken apart for use. Tests of steel specimens welded in the French Government works show a remarkably high efficiency of the welds. This is due to the high protective power of the flux which prevents the formation of oxide on the surface of the welds.—*Machinery.*

C. J. Dorticus, of 36 East Twentieth street, New York, informed one of our representatives that he has, in conjunction with E. W. Snyder, president of the Akouphone Manufacturing Company, invented and perfected a motor vehicle driven by electricity produced upon the vehicle through the agency of a hydrocarbon motor. No storage batteries are employed, transmission gears are dispensed with and the whole structure is claimed to be exceedingly simple and economical, the machine having a radius of 150 miles on one charge of supplies.

Mr. Dorticus stated that his vehicle has been thoroughly tested, and he expects soon to be ready for business. Meanwhile he prefers not to disclose details. He said it is true, as stated in the daily press, that a number of wealthy men have sought options on the patent rights with the object of forming a large company, but he has declined all propositions for the present, intending to complete his own arrangements before entering into any decisive negotiations.

A. J. Kingman, of the Locomobile Company, informs us that his company on July 1 declared a half yearly dividend of 3½ per cent. on preferred stock.

Rapid Steam Raising.

The importance of this subject at the present moment will be apparent when it is considered that our good old friend steam has still to do duty as a motive power in the new era of traffic and traveling which is just dawning upon us, and that to develop the vehicle which has introduced this new era, rapid steam raising is a necessity. The rapid steam raising qualities of a boiler depend upon two properties: (1) The heating surface; (2) the heat production. The duty of the heating surface is to transfer the heat from the source of the heat to the water to be heated. The efficiency of any heating surface, which may be defined as the ratio of the amount of heat transmitted to the whole amount available for transmission, depends upon two conditions: (1) Its disposition with respect to the source on the one side and the water on the other; (2) its extent. As the heat is conveyed through the water by convection currents and not by conduction, we must dispose our heating surface so as to facilitate their production and motion. They consist of the upward motion of hot water and the consequent downward motion of cold to take its place. It would therefore be useless to place our heating surface above the water.

A flat horizontal surface not too far above the source of heat is the best means for the production of convection currents. With this arrangement, however, every particle of water in order to be heated must travel down to the bottom of the vessel, and on account of its rarefication make the return journey. Thus a great amount of time is lost by this traveling; and any means which will reduce the distance which they have to travel will reduce the time in which steam may be raised. Hence, we must decentralize the heating surface, and supply the heat at various points in the water. This is usually effected by forming the heating surface into tubes and passing the hot gases through them. We may, however, carry this principle to the extreme and over decentralize the heating surface, and thereby impede the convection currents, which would be a worse evil. The English standard of limit of decentralization of heating surface is, that the distance apart of the tubes be not less than one-third their diameter. In Continental practice this limit is often exceeded. It will be seen that if the convection currents alone are studied, the tubular heating surfaces would be placed horizontal. Draught, however, must be taken into consideration. All rarefied gases rise and cold air takes their place. Thus natural draught is created. The heating surface constrains the motion of these hot gases; it should, therefore, be in the position of least constraint, that is, vertical. We must therefore make a compromise between these two and have an inclined heating surface. We may find this inclination by means of a parallelogram. If a vertical line *o* A represents the importance of the natural draught, and a horizontal line *o* B the importance of convection currents, then the inclination of the diagonal *o* C of the parallelogram *o* A B C will be the correct inclination of the tubes. If, however, we reproduce the draught by mechanical means, we are more or less independent of the natural draught, and we may then have the heating surface more nearly horizontal.

There are three methods of passing the hot gases through the water: (1) Series; (2) parallel; (3) combination of series and parallel. In the series method every particle of gas traverses the entire heating surface, and thus one of two evils is created: (1) The evil of friction; or (2) the evil of reduction of heating surface. We would have the first evil by a great length of tube of small diameter, and the necessary multiplication of bends. This results in a waste of energy, and consequent drop of temperature of the gases. We would have the second evil by an increased diameter and decreased length. This method is not common in practice. In the parallel method the hot gases are split up into as many parts as there are sections of heating surface, each part having one section to traverse; thus the distance traversed by a particle of gas is less than in the series method, and the loss by friction is thereby reduced. Since the sections of heating surface are not connected they may be readily cleaned and repaired. Professor Rankine found that when the difference between the temperatures of the gases and the water is very great, the rate of conduction through the heating surface increases faster than the simple ratio of that difference and is nearly proportional to the square of the difference of temperature. Hence, in the parallel method we get a greater heating effect at the end of the tubes than in the series. The combination of the series and parallel method is a device to facillitate cleaning and repairs, as the tubes are of shorter length than in either of the previous methods, and generally are not connected by bends but by a combustion chamber. In many boilers of this type advantage is taken of the second set of tubes to force the draught.

Thus far I have dealt only with that method of raising steam which consists of guiding hot gases by means of tubular heating surface through the water. There is, however, the method which is the reverse of this, viz., the guiding of the water through the hot gases. Thus we have by the first method the fire tube boiler, and by the second method the water tube boiler. We have seen that convection currents travel in a vertical direction. The water tubes constrain the motion of these currents of water; they ought, therefore, to be in the position of least constraint, that is, vertical. But there is another consideration, viz., the formation of these currents. We have seen that the disposition of the tubes most favorable to their formation is horizontal. We must therefore effect another compromise by placing these tubes also in an inclined position. We could as before find the correct inclination of the tubes by means of a parallelogram. The usual inclination is about 30° to the vertical. We know that the hot gases have a tendency to rise; if, therefore, we place our tubes so as to intercept the gases, we will get the greatest heating effect. This, however, must not be carried to such an extent as to impair the draught.

Water tubes like fire tubes may be arranged in three different ways: (1) Series; (2) parallel; (3) combination of series and parallel. In the first, the great evil is the bends, which reduce the velocity of the water by friction and eddy currents. This system is confined to that class of water tube boilers known as "flash boilers," in which the water immediately it enters the tubes is converted into steam. In the parallel arrangement, the objection of bends is overcome. This is the system most used at the present time. The combination of series and parallel has the advantage of shortening the length of the tubes; the bends in the series part are usually replaced by a chamber as in the fire tube boilers.

The extent of the heating surface in all classes of boilers is limited by the minimum temperature of the gases to produce the required draught.

We now come to our second division—Heat Production. Heat is kinetic energy, that is, the motion or agitation relatively to each other of the particles of a body. The energy of heat may be developed by the transformation of other kinds of energy. The three kinds of energy most capable of being transformed into heat energy are (1) Mechanical energy; (2) electrical energy; (3) chemical energy. Since the development of mechanical energy is the object of the engineer, it would be absurd to pass it through a cycle of changes only to return to the initial stage with a loss. Since the electrical energy may be directly transformed into mechanical energy, we gain no advantage by transforming it into heat energy for mechanical purposes. Thus, chemical energy is the only one remaining which is really suited to our purpose. Chemical energy is developed by the chemical combination of elements or compounds. The combinations most used in practice are those of elements, and the elements most frequently combined are carbon, hydrogen and oxygen. Of these, three kinds of combinations are formed: (1) Carbon and oxygen; (2) hydrogen and oxygen; (3) these two combinations effected at one and the same time. Carbon is most easily obtained for heating purposes from wood and coal which have been divested of their hydrogen, and are known respectively as charcoal and coke. As wood is fairly well distributed over the surface of the globe, its product charcoal is generally

obtainable; and the use of coal for the making of coal gas brings its product coke into the market. Thus many inventors have turned their attention to the production of rapid steam raising boilers heated by our first combination of carbon and oxygen. the former obtained from charcoal and coke and the latter from the air. Our second combination, that of hydrogen and oxygen, is usually formed from coal gas, Dowson gas and water gas. These, however, have no special bearing upon our present subject. Our third combination of carbon and oxygen, and hydrogen and oxygen effected at one and the same time, is formed from hydrocarbons, as coal, wood, and peat among the solids. These also I mention only for the purpose of clearing the way for the consideration of those fuels which are most adapted to our present purpose, and which fall within the category of this third combination which we have now under consideration, i. e., liquid fuels. It is the use of these fuels in combination with the proper disposition of heating surface, as already indicated, that will produce at once the most rapid steam raiser and the most practicable boiler where rapid steam raising is a desideratum.

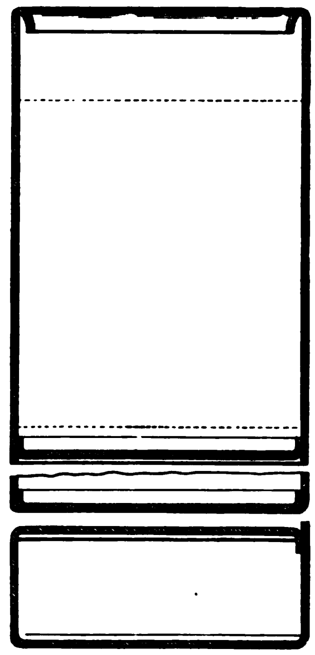
The liquid fuels generally are products of crude petroleum. These have a calorific value of about 20,000 B.T.U., and an evaporative power of two to two and one half times that of coal. Their average chemical composition is: Carbon 84 per cent., hydrogen 14 per cent., oxygen [illegible] per cent. Besides these products of petroleum, there are sources of supply of liquid fuel in (1) the tar from gas works; (2) that which is recovered from coal used in blast furnaces, coke ovens and gas producers; (3) products of the mineral oil industry. Liquid fuels may be divided into two classes: heavy oils and light oils. The heavy oils are those most used in practice on account of their cheapness and safety. To this class belong petroleum refuse and many of the products by distillation of crude petroleum, as kerosene; also the oils derived from the three latter sources of supply. Perhaps the best known of the light oils is gasoline. Being an expensive commodity, there are but few cases in which it is employed. A very convenient method of carrying gasoline has been introduced by Mr. Buxton, the Liverpool agent of the Locomobile Company of America. It is, I understand, the invention of a German chemist, and consists of pebbles formed of pumice stone and manganese dioxide impregnated with silico triethyl formate. This may be impregnated with a solution of hydrocarbon capable of effecting the decomposition of the silico triethyl formate. Mr. Buxton employs gasoline as the hydrocarbon. The gasoline is drawn off by a current of air passing through the vessel containing the pebbles. It is claimed that 100 per cent. more energy is obtained from the gasoline in this way.—*Lecture of G. W. Worrall before the Liverpool University College Engineering Society.*

MOTOR VEHICLE PATENTS..

United States Patents.

703,673. Electric Battery and Mounting Same.—Elmer A. Sperry, of Cleveland, Ohio. July 1, 1902. Filed September 13, 1899.

The battery receptacle consists of a long narrow rectangular case, constructed



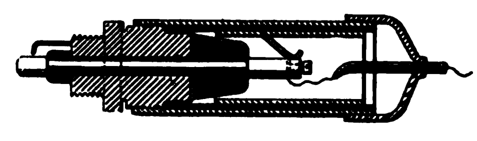
from sheet lead by folding the same as indicated, joining together and sealing the ends of the metal which meet in one of the edges of the case, and closing up one of the ends of the hollow box thus formed by inserting therein another piece of metal, which forms the bottom of the battery receptacle. The bottom, which is preferably bent to provide a flanged portion around its perimeter, is inserted far enough to allow the sides of the case to project somewhat and then lead burning the same. By allowing the sides of the case to project slightly beyond the bottom sufficient material is furnished to accomplish the lead burning and also a corner to catch and hold a portion of the lead as it is burned. In this way the edges around the bottom and one or more corners are stiffened by solid masses or added thickness of the material resulting from the burning. This lead cup used as a case for a storage battery is preferable to other materials—such, for instance, as hard rubber—owing to the extreme brittleness and also the expense of the latter, and, furthermore, it being an excellent conductor, may easily be employed as a part of the conducting system. Its use in this connection is contemplated in the present invention.

703,674. Connection for Batteries.—Elmer A. Sperry, of Cleveland, Ohio. July 1. [illegible]d September 13, 1899.

Re[illegible]battery case described in the preceding patent, since the walls of the cell are extremely thin they must be supported to prevent buckling. This support is preferably effected by wrapping each cell with an insulating mass—such, for instance, as tarred felt or fibre—which is applied so that it shall extend above the top of the extension. The insulation is applied in a number of layers, so arranged that they fold under the bottom of the case and provide a reinforcement therefor. A stiff plate of hard rubber is interposed between the bottom of the case and the insulating material to provide additional support for the bottom, which is also made extremely thin.

703,759. Electrical Sparking Device.—A. C. Brown, of London, England. July 1, 1902. Filed December 21, 1901.

The invention consists in the combination, with a sparking plug, of a condenser whose plates or armatures are of tubular or cylindrical form, one of said tubes being an extension of the body of the plug, while the other is contained within



the first and is in immediate metallic connection with the electrode in the sparking plug, so as to produce oscillatory discharges across the spark gap and provide that the current generated by the induction coil shall be slightly stored by this condenser and sent in larger quantities across the spark gap, thereby producing a much "fatter" and more flaming spark.

703,875. Active Material for Storage Batteries.—Walter E. Winship, of San Francisco, Cal. July 1, 1902. Filed March 14, 1901.

A quantity of lead oxides is moistened with glycerine or a solution of glycerine and water (water, one part; glycerine, three parts) and stirred to a paste and applied to a metallic framework or grid. The paste has the property of setting quickly and firmly. The plates so formed are immersed in a solution of Na_2CO_3 (sodium carbonate) and made cathodes in an electrolytic cell. After a certain time the paste becomes completely transformed into spongy lead having a peculiar structure—viz., a compact mass of parallel threads of lead having their axes at right angles to the exposed surface of the plates excepting in the neighborhood of the metallic conducting parts of the frames. There they run more nearly at right angles to the conductors, and at these parts the spongy lead is more dense and is plated onto the frames. These are very important features, for the following reasons: First, the plating insures perfect contact of the spongy lead with the frame; second, when used as electrodes in storage batteries the threadlike and porous structure allows a free diffusion of the electrolyte and causes also the most uniform discharge possible, at the same time permitting great rapidity of discharge

without diminution of electromotive force, thereby allowing the active material more nearly to give up all its chemical energy in the form of electrical energy; third, the tendency to "buckle" the frames is lessened in proportion to the increased porosity.

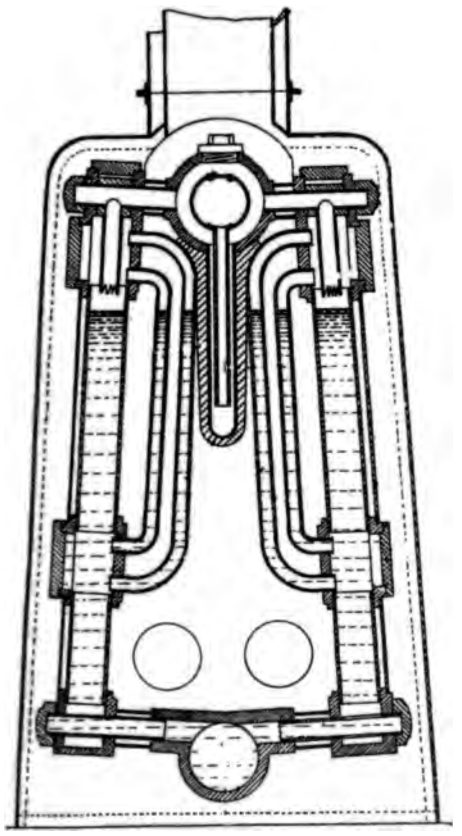
703,881. Driving Gear for Motor Vehicles.—Earl E. Wright, of Rochester, Pa. July 1, 1902. Filed September 26, 1901.

A combined driving and steering gear in which bevel pinions are mounted on the steering knuckle pins.

703,362. Steam Boiler.—C. P. Altmann, of Lyons-Vaise, France. July 1, 1902. Filed September 7, 1901.

The boiler is of the multitubular type, and has a relatively large heating surface. The water circulation is easy and effective, and the steam produced superheated. The parts of the boiler which do not contain water are beyond the reach of the hot gases, as also are the parts which receive the sludge, lime, etc., and the expansion of the tubes will accordingly take place evenly.

The elements of the steam generator are arranged within an outer casing and con-



sist on either side of a series of similar elements symmetrically arranged. Each element consists of a tube arranged vertically or slightly inclined, and communicates at the ends with two steam collectors connected by tubes suitably bent toward the ends.

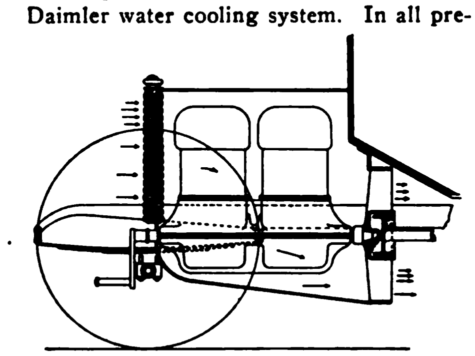
On the upper part of the steam generator there is a steam superheater consisting of a horizontally arranged cylinder, communicating with each of the upper collectors by means of a tube. On the under side of the superheater there is a series of tubes, which are open only at their upper ends and contain concentric tubes of small diameter, which communicate at their upper ends with a cylindrical drum arranged concentrically within the outer superheater cylinder. This drum is open on its upper side to permit the introduction of the inner vertical tubes. On the upper side of the superheater cylinder there are screw threaded plugs, facilitating the replacing of the inner vertical tubes. A reservoir is located at the bottom of the boiler to serve for collecting the deposotis and scale.

703,374. Mechanism for Electric Propulsion of Road Vehicles.—D. S. Bergin, of Chicago, Ill. July 1, 1902. Filed September 28, 1901.

The object of this invention is to provide means whereby the electric current as conveyed over the usual trolley wires may be utilized to propel the ordinary road vehicle in such a way as to enable the latter within certain limits to vary its course and turn laterally in either direction away from the line of the conductor, thereby enabling vehicles to pass each other upon a given line or to meet other contingencies incident to such vehicles.

703,436. Motor Vehicle.—Wilhelm Maybach, of Cannstadt, Germany. July 1, 1902. Filed March 31, 1902.

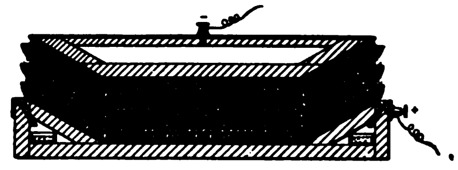
The patent relates to the well known Daimler water cooling system. In all pre-



vious constructions of this kind the air heated by passing through the cooling apparatus, as well as the vapors from the motor and the lubricating oil, leaves the protecting box through openings provided in the side walls and in the doors of the protecting box and in consequence thereof incommodes the people sitting in the carriage. According to the invention this disadvantage is overcome by pumping the hot air, together with the vapors of the motor, out of the protecting box surrounding the same, so that this air leaves the box on the back wall of the same underneath the footboard of the carriage. The arrangement has, furthermore, the advantage that the formation of a vacuum behind the motor—i. e., behind the lower part of the same—and the whirling movement of the air caused by this vacuum, which movement causes dust to be stirred up, is avoided.

703,490. Storage Battery.—Malcon O. Smith, of Depew, N. Y. July 1, 1902. Filed July 13, 1901.

Relates to improvements in so called



high tension storage batteries. The battery consists of a series of superposed metallic plates made in the form of trays with outwardly sloping sides and ends, making the bottom of the trays along a central longitudinal line. These trays contain the electrolyte and divide the battery into a series of cells, each cell containing a positive and a negative electrode, the positive electrode being formed on one side of the plates and the negative one on the other side thereof, the end plates, which have but one electrode, forming the poles of the battery, while the intermediate plates, which have electrodes on both sides, electrically connect the cells. The trays are made of lead and have a supporting grid for the active material formed thereon integrally with the body of the tray and adapted to hold the electrode in conductive connection therewith. The grid is formed by plowing the faces of the plate within the outer marginal portion with a suitable cutting tool, thereby transforming it into thin laminæ, which are vertically disposed, their inner ends remaining united to a core in the centre of the plate.

The trays are supported on a non-conducting rack, into which the bottom tray fits and in which it is secured by means of a guttered flange, formed on the edge of the tray and adapted to catch all drippings from the trays and conduct them into a trough concealed in the supporting rack.

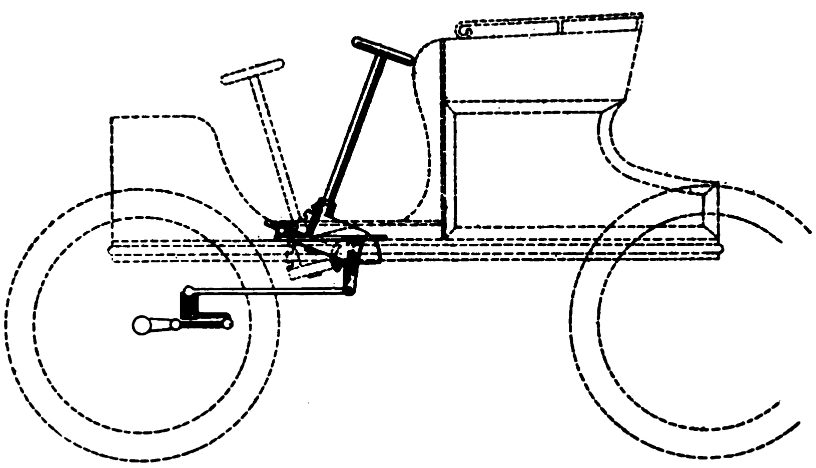
The top tray is made into a follower by reinforcing it with a frame of wood fitted into the tray, and the edges are extended over the frame to form a metallic contact on top of the cover. The trays are acid tight and are supported one upon the other by non-conducting porous separator plates.

703,552. Steering Gear.—Walter A. Crowdus, of Chicago, Ill. July 1, 1902. Filed July 19, 1901.

The invention provides a locking device for a combined steering and speed control lever. The locking device consists of a lock bolt carried by the steering post, a fixed support with a groove therein concentric with the steering post and adapted to be engaged by the lock bolt. The lock bolt is released by a spring.

702,980. Steering Mechanism for Motor Vehicles.—Hiram Percy Maxim, of Hartford, Conn. June 24, 1902. Filed October 20, 1899.

This invention relates particularly to that part of the steering mechanism which is carried by the body of the vehicle, and is directly manipulated by the driver. It is necessary that the steering post which rises from the floor of the vehicle body



No. 702,980.

shall be placed within easy reach of the driver, and it is also desirable that it shall be capable of movement toward or away from the vehicle seat, both for the convenience of the driver and to facilitate the movement of persons into and from the vehicle. At the same time the operative relation of the steering post to the other parts of the steering mechanism should not be affected by the movements of the steering post, and the leverage of the steering wheel or handle should remain always the same.

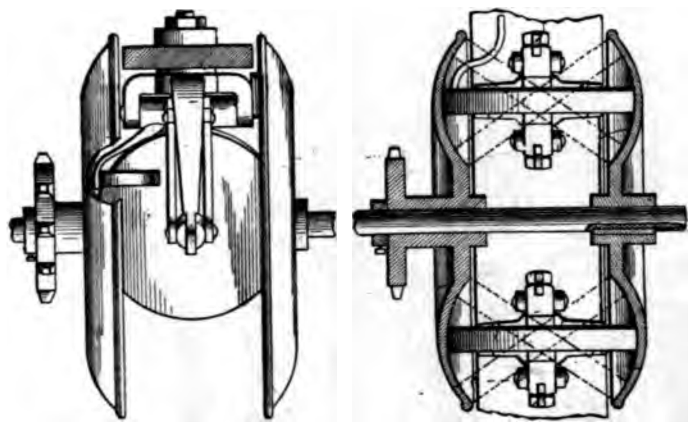
In the embodiment of the invention here shown the steering hand wheel is mounted upon a shaft which carries at its lower end a skew-gear. The latter meshes with a corresponding gear on a short transverse shaft, which is mounted in suitable bearings on the body of the vehicle and substantially in the plane of the footboard, and has an arm connected by a link to the steering knuckle, etc. The steering shaft has its bearing in a bracket which is swiveled upon the shaft of the gear sector or on bearings concentric therewith. Thus, operative connection between the steering post and the other parts of the steering mechanism is always maintained, whether the post be swung back toward the seat of the vehicle, as shown in full lines, or swung away from the same, as shown in dotted lines, and in all positions the leverage of the steering wheel or handle remains the same. The bracket is arranged to be engaged by a latch to retain the steering post in the most convenient position for operation.

703,177. Cooler.—Herbert H. Buffum, of Abington, Mass. June 24, 1902. Filed September 16, 1901.

The invention relates more particularly to a pipe connecting device for radiating coils and is described by one of the claims as follows:

The combination of a pipe connecting rack or holder formed with a plurality of apertures, longitudinally divided bushings in said apertures, pipes projecting through the bushings and connected by said holder and formed with flanges overlying said bushings, a return bend connecting the pipes and means connective of the holder and the return bend and detachably holding the same and the pipes in assembly.

703,237. Variable Speed Friction Gearing.—Edward P. Cowles, of Warren, Ohio. June 24, 1902. Filed December 7, 1900.

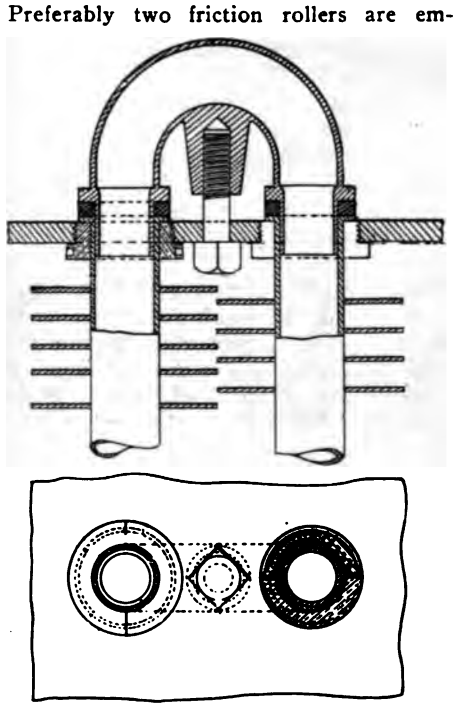


No. 703,237.

The invention relates to a friction disk device comprising two grooved disks with a number of friction rollers between. Preferably two friction rollers are employed, so arranged as to be adjustable from the position indicated in full lines to those indicated in dotted lines, whereby the speed of the driven disk can be varied without affecting the rotation of the shaft and the disk fast thereon. When the friction rollers are in normal position their planes of rotation are tangent to a circle at right angles to and concentric with the shaft at their points of contact. When the rollers are in such position that their points of contact with both disks are equidistant from the shaft, both disks will rotate with the same speed; but, as is apparent, the relation of the speed of the driven disks to that of the driving disk may be varied by adjusting the friction rollers from a position of parallelism with the shaft to a position at an angle thereto. With devices heretofore proposed for adjusting the friction rollers relative to the disks the roller always occupied a position in which its plane of rotation was tangent to a circle having its centre in the axis of the shaft, and such adjustment necessarily required the expenditure of considerable power to overcome the friction between the roller and the disks. To effect such movement of the friction rollers automatically and with a minimum exertion of power on the part of the operator, they are mounted so that they can be adjusted from their normal tangent position into a position in which their planes of rotation will not be tangent to a circle described about the shaft through the points of contact whereby the engagement of the disks with them will cause the rollers to move in a spiral path toward or from the axis of the disks.

703,757. Automatic Feed Regulator for Steam Boilers.—J. S. V. Bickford, of Camborne, England. July 1, 1902. Filed March 7, 1902.

To the boiler at about the normal water level is connected the lower end of a tubular vessel which is formed with an annular jacket, communicating at its upper part with the boiler, either directly, as indicated by dotted lines, or through a feed heater. Within the vessel is an inner closed tubular vessel, and from near the bottom of this, which is closed, a pipe leads to a diaphragm valve. The jacket of the tubular



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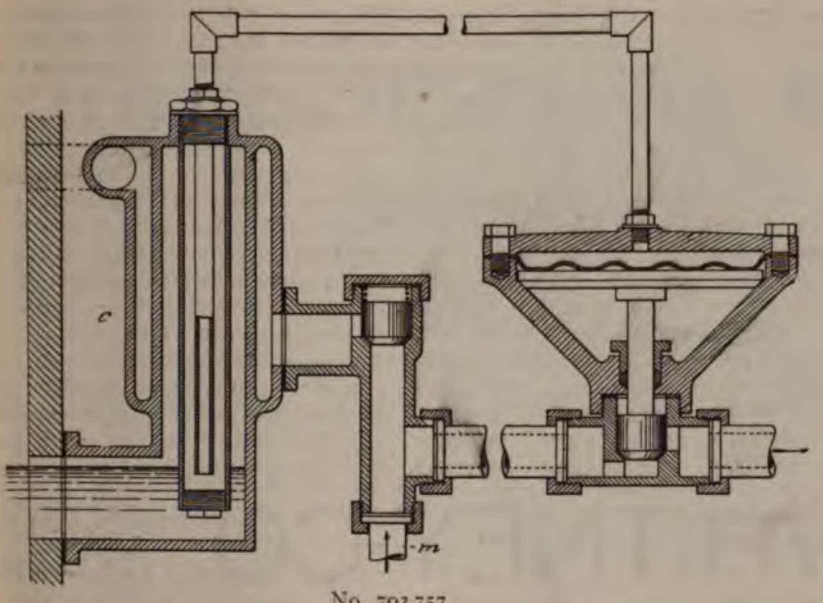


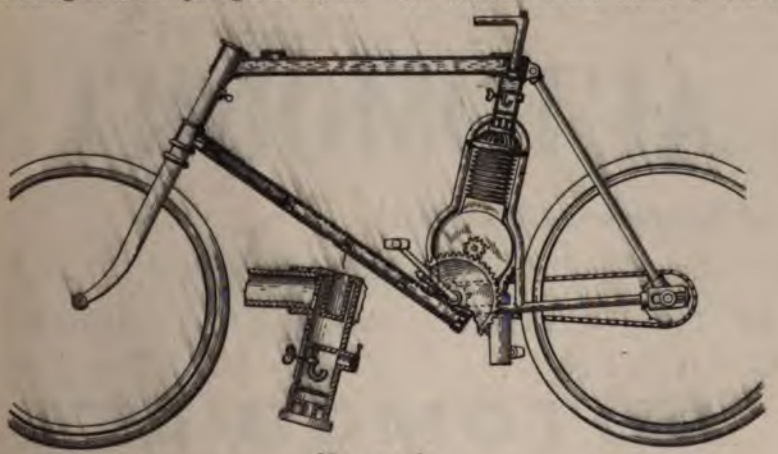
No. 703,757.

vessel communicates by a passage provided with a check valve, with the discharge pipe of the feed pump, the passage having a lateral bypass to the space under the diaphragm valve, from above which there is a passage to the suction pipe of the feed pump.

When the water in the boiler sinks below the normal level steam enters the tubular vessel, and the liquid in the inner vessel is heated and partially vaporized, and the pressure acting on the diaphragm closes the diaphragm valve which constitutes a bypass.

703,769. Motor Vehicle.—George E. De Long, of New York, N. Y. July 1, 1902. Filed February 25, 1901.

The peculiarity of this machine is that all the accessories of the motor—ignition devices, gasoline tank and carburetor—are disposed in the frame members, as shown in the illustration. The inventor makes the claims that aside from the motor there are no attachments secured to the outside of the frame of the bicycle.



No. 703,769.

Automobile Regulations in Germany.

The police regulations for motor vehicles which are in force for the police district of Berlin embody the following points: All vehicles must work safely, and excessive noise, smoke or steam, and smells are not permitted. Exhaust appliances, either for steam or gasoline engines, must be placed out of sight as far as possible. Steering gear must be easy of manipulation, rendering it possible to turn on roadways of a width of 10 metres, and motor cycles in a width of 3 metres. Exceptions are made in favor of motor vehicles for heavy goods. All vehicles must have two brakes independently manipulated, it being requisite for each brake to be able to stop the vehicle on a level dry asphalt road in a maximum length of 8 metres when traveling at a speed of 15 kilometres per hour. Motor cycles need only have one brake apparatus. A hooter must be attached to each vehicle, which must be regularly sounded, although excessive loudness or shrillness is objected to. Each vehicle must carry two lamps at the sides, enabling the driver to see the roadway for at least 20 metres in front. Motor cycles need carry only one lamp. No lamps may have colored glass. Each motor vehicle must have attached a plate giving the maker's name, horse power of the engine and the weight of the vehicle. It must also have a special police license number, granted by the local police authorities of the district in which the owner resides. This number must be placed at the back or on both sides of the vehicle, easily visible and illuminated at night. Steam vehicle owners must provide evidence of having fulfilled the special regulations governing the working of steam boilers. All owners' names and addresses are registered. The police have power to grant certificates in regard to special types of vehicles being manufactured on a commercial scale, relieving the owner of the obligation. Motor vehicles in temporary use in the Berlin police district are not subject to these regulations, provided proof can be given of their complying with the police regulations in force at

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the place where the vehicle is permanently housed. The police can at all times call for the re-examination of any licensed vehicle, and temporarily or permanently exclude same from being used on public highways if deemed necessary. The owner is responsible that his vehicle shall not be driven by an incompetent person. Licenses for driving are granted only to those conversant with machinery, and any certificate may be called in by the police if the police regulations are violated. No person under eighteen years of age is allowed to drive an automobile. The driver and the owner are equally responsible that the police license number is attached, and the certificate granting this license number must always be available for inspection by the person in charge of the vehicle. Certain roads can be debarred from use for automobiles by the police. The maximum speed at night in the city streets is not to exceed 15 kilometres per hour. Beyond the closely inhabited area the speeds may be increased on roads on which a good view can be obtained. Racing on public roads and streets is prohibited, except with the special consent of the police. In congested districts, or on slippery roads, speed must not exceed that of a slow trotting horse. At narrow bridges, sharp turnings, or steep roads, and other similar places, and where a good view cannot be obtained, vehicles must be reduced to a speed at which they can easily be brought instantly to a standstill. Lighted lamps are compulsory after dark, and during thick fogs. Notice of the approach of the vehicle is obligatory, although it is specially provided that the signaling is not to be excessive, so as to annoy or render horses restive and nervous. Upon leaving the motor vehicle, the driver must stop the engine or disconnect the driving gear after applying the brake, and must so provide that the vehicle cannot be set in motion by unauthorized persons. Trailers are not permitted except by special permission, with the exception in the case of a motor cycle, which is considered with its trailer as a single automobile. Violations of these regulations are punishable by a fine not exceeding 60 marks, or imprisonment for not more than fourteen days.

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Growing Tired of Racing.

The racing supremacy of the French appears to be on the wane. In the recent Gordon Bennett cup race the French Club was represented by three vehicles, which had only a single opponent, so that if all the vehicles had been of equal merit and the drivers equally skillful, the chances of the French equipment winning in the event were three to one. That they lost was, therefore, a rather humiliating defeat. In the Paris-Vienna race, the racing honors of the French were saved by a very narrow margin. In fact, but for a number of decisions by the committee in charge of the race, which decisions, by the way, have resulted in numerous and emphatic protests from non-French contestants, a non-French racer would have won this event also. The contestant, who was adjudged the winner, violated the rules of the contest by speeding into Vienna at full rate, but no notice was taken of this violation of the rules, while the competitor who arrived second in Vienna, and according to a Reuter report, actually made the best time for the whole distance by fourteen seconds, had forty-eight minutes added to his actual running time for having exceeded the time limit in Switzerland, owing to detention by the police.

We do not wish to either criticise or defend the action of the committee, leaving that to the authorities of the sport, but merely mention these facts to show that in view of their overwhelming chances the French vehicles made a poor showing. As in other games of chance, when luck turns against a player, he is likely to be reminded of "some business engagement." The French manufacturers, according to a contemporary, have come to the conclusion that races of this kind are not worth the enormous expense they occasion. Paris-Vienna, they say, was especially ill advised, since Switzerland would not allow the race, and hence was lost ground, and because of the awful racking effect of the 490 cross gutters on the roads of Austria. The event cost enormously, and the results are decidedly questionable.

It is quite possible, therefore, that long distance international races will henceforth be a thing of the past, for in addition to the steadily growing reluctance of the authorities to grant permits for such events, strong opposition is springing up among manufacturers themselves. If Paris-Vienna should prove the last of its kind, so much the better for the industry.

Mechanically Operated Inlet Valve.

A French contemporary notes that among leading manufacturers of gasoline carriages there is a tendency to adopt mechanically operated inlet valves. This year's Mercedes motors are fitted with such valves, and next year's Mors will also have them, and our contemporary believes that the use of such valves in a few years will be general.

Automatic valves, operated by suction, have been almost exclusively used up to the present, and when well constructed they seem to operate very satisfactorily. They may be (and generally are) completely inclosed, and produce then a minimum of noise. The number of conspicuous operating parts is reduced, and the motor presents an appearance of greater simplicity than when the exhaust valve springs, push rods, cams and (possibly) cam gears are duplicated. And what is more, there is an actual gain in simplicity.

The possible advantages of mechanical operation of the intake valves are few. Greater accuracy in the time of opening and closing may possibly be secured, although this is denied in some quarters so far as variable speed motors are concerned. Yet it is conceivable that large valves of motors with high piston speed are too sluggish in closing, and that on this account a certain amount of power is lost. The lifting power depends upon the area of the valve head, and varies therefore as the square of the valve diameter. The tension of the spring must be made proportional to this lifting power. The weight of the valve, on the other hand, increases faster than the square of the diameter, as the valve head must be increased in thickness at the same time that its diameter is enlarged. Hence the weight of a valve is a higher function of the valve diameter than the spring power should be, and a large valve is, therefore, sluggish in closing. Another defect of automatic intake valves that might be remedied, at least partially,

by mechanical operation, is their tendency to gum and stick in their seats. With the greater operating force of mechanical operation the valves, if gummed, would, no doubt, be dislodged in general, but cases occur where the valves become exceedingly tight in their seats, and then breakages might occur.

Mechanical operation has its advantages and drawbacks. We doubt that the former are equal to the latter in a motor of moderate piston speed. However, the industry is at present swayed to a certain extent by fads—imitations of innovations made by successful firms—and it is not unlikely that, as prophesied by our contemporary, the mechanically operated inlet valve will be largely adopted in the next few years.

The Sense of Speed.

Some time ago a speed guessing contest was held in Paterson, N. J., in which people standing on the sidewalk were required to guess or evaluate the speed of passing automobiles. Some years ago two members of the French Automobile Club arranged between themselves a contest of a similar kind, in which, however, the guesser was to occupy a seat in the vehicle. These events suggest the question to what degree of accuracy speed may be judged.

It is well known that speed is not a simple quantity and that it cannot be gauged directly. It is the quotient of space divided by time, and all impressions of speed are composite or, rather, secondary impressions based upon impressions of space and time.

The evolution of speed might therefore be considered to consist of three distinct operations, viz., the evaluation of distance, the evaluation of time and the process of mentally dividing the former by the latter. Now it is evident that there must necessarily be errors in the first two processes, and even granting that no error occurs in the division, it will be seen that comparatively large errors are possible in speed estimation; for the two errors of observation may be of opposite sign, in which case the error in the quotient of one of the estimated quantities by the other is equal to the product of the two errors.

While man may not be endowed with a separate sense for speed, it cannot be denied that by means of his proper senses he is able to form a rational idea of the speed at which he is moving. And his ability in this respect can be improved by training. The factors on which he must depend for obtaining an idea of speed include the time in which familiar objects are passed, the pressure of the air due to the motion through it, the vibration of the vehicle, etc. It is contended that all these factors are variable. The objects seen along the road are all of different size, or length, in the direction of the road. The air pressure depends upon the direction and velocity of the wind, and the vibration and noise of the carriage depend upon the particular construction and upon the road surface.

All these are disturbing factors, no doubt; it is nevertheless true that a trained person can gauge the speed of a vehicle quite accurately. Such disturbing factors are encountered in estimating even the simplest physical quantities, such as length. A thin rod, for instance, appears longer than a thick one of actually the same length, while the dimensions of irregularly shaped bodies are the most difficult of all to estimate. The estimation of temperature is also subject to peculiar disturbing influences. If one plunges his hand successively into vessels of water at different temperatures, the water in any particular vessel will appear warm or cool according to whether the hand has just been withdrawn from cooler or warmer water.

Estimates of any physical quantity or function of physical quantities can never attain the degree of accuracy that a metre should have, but a useful degree of accuracy in speed estimation can certainly be attained by practice. Practicing speed estimation by the aid of a speed indicator would lead to a useful accomplishment and form at the same time a pleasant diversion. The idea of speed estimating contests is therefore called to the attention of the clubs.

Schooling Horses

The greatest opposition to automobiles, in country districts at least, is found among owners of young and restive horses, which become frightened at passing automobiles, whether moving fast or slow. Much annoyance is also caused automobilists by shying horses, and horse owner and automobilist are therefore equally interested in educating horses into fearlessness of automobiles.

Many horse owners in districts in which automobiles are popular have taken the trouble to make their animals thoroughly familiar with automobiles, and now enjoy the satisfaction that their horses are perfectly indifferent to these vehicles. When an automobile is standing at the curb in a country town with the engine running, one very frequently sees horse drivers carefully driving past, trying to get as near as the horse's nervousness will permit, and at times repeating the performance. Horse drivers are therefore evidently willing to go to some trouble to familiarize their horses with automobiles and thus avoid annoyance and risk of accident due to sudden shying. In city districts and in the larger country towns opportunities for educating the animals to automobiles are usually found, but few opportunities are offered the farmer and horse owners living in towns where there are no automobiles. We are therefore glad to learn that the Automobile Club of America has undertaken to establish "schools" all over the country where horses may be educated into familiarity with automobiles. Some experiments have recently been made, and a method has been devised by which horses can be schooled in a very short time. The Automobile Club proposes to publish a pamphlet on this method, which will be distributed among those who wish to avail themselves of the opportunities offered by the schools.

Schools of the kind referred to are already established in Kenosha, Wis., by Thomas B. Jeffery & Co.; in Long Branch, N. J., by Jefferson Seligman, and at Lenox, Mass., by President Shattuck, of the Automobile Club of America. All these schools are free. It is to be hoped that horse owners generally will appreciate the efforts made in their behalf by the automobilists and will take advantage of the opportunity offered.

England and the Gordon Bennett Cup.

Our English contemporaries are jubilant over the fact that the Gordon Bennett cup was won by an Englishman. English manufacturers, it appears, have been suffering much from the competition of their Continental rivals, and now that a car entirely of English manufacture, tires and all, has outlasted its French competitors, it is expected that the idea that French construction is superior will lose ground in England.

The conditions of the cup race as laid down by the founder thereof stipulate that it shall be held in the country the club of which holds the trophy at the time. Hence the race would have to be held in England

next year. But the sanction of the authorities for a 550 mile road race in England is practically unthinkable. The contest will then have to be held in some other country or some other form of contest must be substituted for the cup race. If the latter course is decided upon, track racing will probably be resorted to in order to compete for the cup. An unlimited non-stop contest on the road at legal speed would undoubtedly be of greater practical value, but since the cup was donated originally as a sporting trophy, it is hardly likely that questions of practical utility will have any weight with the founder or the clubs in whose custody the trophy has been placed.

The Causes of Automobile Accidents.

A Presentation of the Principal New Factors Introduced Through Automobilism, and Affecting the Safety of Traffic on the Highways.

BY M. C. KRARUP.

All over the United States there is a cry for protection against the automobile. Those of even temper prefer to say that they have no quarrel with the automobile as such, realizing that it is only a tool in the hands of its driver. Their warfare is against the automobilist who uses this tool recklessly, foolishly or unskillfully. But the majority are less inclined to make nice—and withal doubtful—distinctions, and include the whole automobile movement in their curse. Curse it is. No milder word can describe the expression of their indignation as it has been voiced in very respectable organs of the press. If any among the ranks of automobilists are blameless, these accusers may be willing to listen to a defense, but serious accidents caused through the use of automobiles have been so numerous that public opinion at present reverses the rule of law and declares all guilty until proven innocent. Even among automobilists there are many who admit that the press and the public could not well be expected to take any other standpoint so long as accidents continue as the daily grist of the automobile movement. As between cursing and being cursed the condition is gradually becoming equally as intolerable to the well intentioned user of automobiles as to the people at large who see their right to the pursuit of happiness threatened by the new tyrants of streets and highways. In other words, the "automobile problem" has waxed acute and national and craves solution.

Were it not generally conceded that the pleasure automobile of today is only a forerunner of the highly useful mechanical vehicle of tomorrow, the solution would be simple and summary. Whatever tolerance is accorded the drivers of power vehicles at the present stage of the automobile movement is due mainly to the patience of a progressive people toward everything which incidentally promises to raise the standard of civilization to a higher plane, and to a general desire not to fall behind the rest of the world in the arts and industries. What causes much impatience, on the other hand, is the apparent slowness of the automobile movement in redeeming its promises of utility to all. Gottlieb Daimler, the "father of the automobile;" Levassor, his disciple, and even the versatile Marquis De Dion started into the automobile industry almost solely with the object in view of producing slow speed utility wagons. A new sport was not even thought of, but since 1895 it has seemed at times as if the original objects had been sidetracked and that the whole energy of the movement were now directed upon the production of speedy vehicles, more or less dangerous to the ordinary road traffic. In fact, among automobilists and automobile club members very few only show more than a perfunctory interest in any other class of self propelled vehicle than that which appeals to their demand for a new sport or pastime and exclusive forms of fashionable living. The good work done in more useful directions is still largely under the surface, because it has no conclusive results to show or spectacular effects to display. Under these circumstances the "automobile problem" deals almost exclusively with sporting vehicles, and aims almost exclusively at reduction of the speed which is their most sensational feature. The means considered for its solution is almost invariably the enactment of a new law, under the supposition that a new thing like the automobile must be put in a special legal pigeonhole, surrounded with new definitions, regulations and exceptions, before the community can have peace.

So far the results of the laws which have been passed have not been very satisfactory. The automobile accidents instead of being reduced in number have grown more and more frequent and more and more serious. There would be no automobile problem to solve if good results had been obtained by special laws prescribing speed restrictions. All that would be necessary would be to extend these laws to all localities. In order to find the cause of their ineffectiveness a thorough diagnosis of the new elements of danger introduced in the street and road traffic by automobiles is required, and it is not sufficient to simply take it for granted that because speed is a dangerous quality it is the only one that should be hedged with precautions. Nor, indeed, that any special statutory law is required in order to enforce such precautions.

It is true that by great speed reduction nearly all other sources of danger would also be reduced to a minimum, and theoretically it should therefore be sufficient to enforce low speed. If 8 miles per hour does not prove low enough the limit should be made 6 or 4 miles per hour. Finally some point could be reached where the automobile would be almost as harmless as when standing still. No doubt many would find a law highly acceptable by which automobiles were made stationary or nearly so. To those who do not wish to kill automobilism it is evident, however, that its legal speed limit must not be made lower than that prescribed for horses, and if automobiles are dangerous traffic at horse speed it must be found wherein such dangers consist. The question must also be considered as to whether speed regulations are enforceable, and if they are found not so in their present form by what means they can be made enforceable, if they cannot be dispensed with altogether.

The subject being comparatively new all the points worthy of consideration have never been presented with any approximation to completeness. Legislators, on one side, and automobilists (usually on the other side) have been content with partial explanations and partial remedies. Those inclined to go deeper into the subject have usually been unfamiliar with automobiles, and those familiar with automobiles, from their practice in driving them, have been indifferent to the proper principles of lawmaking. They have appeared as persons seeking merely to avert public interference with their private diversions by the most plausible means which they could contrive. The legislative work which has been consummated has represented a compromise between opposing desires and prejudices, while a rational consideration of intrinsic reasons has been lamentably scarce and insufficient. Though it is probably true that the clash of desires or self interest and the friction between a multitude of one sided views or notions eventually may lead to acceptable results, being somewhat similar to nature's methods, as expressed in that hackneyed term, "the survival of the fittest," it represents a method much too slow for an acute condition and much too slow for mortal man, whose life speeds on under the intolerable temporary makeshift arrangements to which it gives rise, pending the ultimate arrival of a leader who pronounces the keynote of the situation. The keynote to the automobile situation has not been sounded as yet, however, and this is largely because its complexity has been very much underrated. Instead of having only one new factor to deal with, namely, the speed possibilities of automobiles—at least fifty other factors may be mentioned, which are equal to high speed in the production of accidents, and perhaps even more elusive to regulation by statute law. All of these factors are more or less closely connected, organically. In the organism of an automobile they form the vicious elements which eventually must be educated out of existence, through the instrumentality of auto-

mobile manufacturers, or curbed by the restraints imposed by society.

To present a properly proportioned survey of these elements is the purpose of this article, so as to supply in one place most of the raw material of facts and ideas that should be brought to bear upon regulative action by the commonwealth with reference to automobiles and their use.

It has been customary to regulate the use of motor vehicles without regard to the source of power and other important differences in construction. Two or three years ago, when electric vehicles were popularly looked upon as the coming type and all others as freaks, park boards and other local authorities were inclined to make their restrictions less severe for this class of automobiles, on the theory that they were comparatively noiseless, entirely odorless and not likely to scare horses, being similar in general appearance to horse drawn carriages. This discrimination has been found impracticable, mostly because those who made it were charged with partiality by the constantly growing number of persons interested in steam and gasoline vehicles. It was also noticed that a very large percentage of serious accidents, especially fatal run overs, fell to the share of the heavy electric cabs, notwithstanding their moderate speed, seldom exceeding 12 miles per hour (except on down grades).

The frequency of runovers by electric cabs has continued till this day and suggests much with regard to the causes of automobile accidents in general. This will be seen more clearly later on. At this point, however, lies the first indication that speed is not the sole cause of the dangers incurred through automobile traffic, and that legislation aimed exclusively at speed reduction is inadequate to the requirements when not extremely radical, and, on the other hand, is tantamount to suppression of the automobile movement when sufficiently severe for its purpose.

In order to perceive clearly the multitude of factors which render automobiles more or less dangerous or disquieting, or otherwise bear upon the problem of traffic regulation, it seems necessary to classify them, and those of a mechanical character may be passed in review first.

Speed capacity is easily the most conspicuous of the mechanical elements which threaten the security of traffic, but it is after all only a possibility, depending upon the volition of the driver, and not a quality in actual and constant operation, or a defect which may crop out at any moment. In this respect the horse's speed capacity is really more threatening. Viewed as a distinct mechanical feature and apart from the driver's possible inclination to abuse it, speed capacity is far less momentous than the peculiarities in the mechanical arrangements for checking, stopping, reversing and steering of automobiles. Commonly the advantages possessed by most automobiles on these points—so long as the vehicle is in perfect order—have been dwelt upon by automobilists as prima facie evidence in favor of permitting high speed. It is among the laughable things in the movement that "the perfect brake control" and similar theoretical advantages, which are just sufficiently real to "show up" well at prearranged trials but whose efficiency can only be proved by results in everyday use, can be seriously urged by serious men in advocacy of high speed, in the face of daily accidents which prove their insufficiency. Because brake control is an absolute requirement in automobiles—in default of which they could not be tolerated—the reasoning of partisans jumps to the conclusion that, once accomplished, it justifies something more than ordinary traveling speed, demanding in fact that the permissible speed shall be increased above that of horses in direct ratio to the increase in stopping ability. There is in this conception an utter disregard of all the non-mechanical factors which go to produce danger and especially of the one all important fact that accidents practically always are due to errors in judgment, confusion or inadvertency, and not to deliberate attempts at doing difficult things. This difficulty of having proper valuation accorded to the factors which are in their nature indefinite seems to be the great obstacle to reaching a sound basis for automobile traffic regulation. In debate these factors seem weak in comparison with the "facts and figures" connected with mechanical data. Those who can offer the latter in favor of their standpoint seem the best informed. But these facts and figures, even if correct, so far as they go, are seldom conclusive. Say, for example, that it is proved that an electric cab cannot travel faster than 12 miles per hour, it is readily overlooked that this refers only to the level street and that it can go much faster on an almost imperceptible down grade. Say, also, that it can be stopped in about 50 feet when going at 12 miles, by test. It may count for very little with the majority of persons to call attention to the fact that the motor and wheels of an electric vehicle are always in mesh, so that a cab cannot be stopped suddenly without stopping the motor suddenly, and that drivers are instructed to avoid such stoppages for fear of injury to the motor. It is easy to imagine that the driver, held responsible for the property in his hands, will take long chances on the safety of a pedestrian rather than have his pay docked. While electric vehicles usually have a controller reverse, which is, in fact, indispensable for their management, it will not in practice be used for emergencies, but only for slow backing, as when turning around in a narrow street. It is the brake on which reliance is placed for quickly reducing the speed of one of these vehicles, which are so much heavier than other automobiles that the available power at any given time becomes very small for their momentum, even though an electric battery possesses considerable advantages over a gasoline motor in regard to the possibility for a momentary increase of power development. This advantage is killed partly by the greater weight and partly through the driver's solicitude for the integrity of his machine. The brake is therefore put to double hard work; and here again the weight asserts itself as a factor that makes for accidents, for sooner or later the hard usage will wear the brake mechanism out and only a rigorous system of daily inspection offers some guarantee that the brake will not fail completely when most urgently wanted.

This applies, of course, also to gasoline vehicles, in which a sudden reverse is entirely out of question as a means for averting accident, because the motor stops completely when overloaded, and a single explosion—actuating the reverse gear—means very little in its dynamic economy. This feature is thoroughly recognized in all modern gasoline vehicles by rendering it impossible to apply the brake without first releasing the gear clutch. It is also recognized by having an auxiliary set of brakes, and, in the practical operation of this class of automobiles, by depending almost altogether on the foot brake and very little on the engine for the little modifications of the speed which are constantly required in crowded traffic. In other words, the brakes, and especially the foot brake, are the main guarantees of safety, and any variation in their efficiency is a source of danger, to which there is nothing exactly corresponding in horse traffic. With horses the animal organism if in good order for going ahead is also in good order for stopping and for steering. Any special incapacity makes itself known through the whole action of the animal, and as a rule with due warning. Nothing breaks suddenly, and herein lies the best safeguard against the dangers due to the fears and other sudden emotions to which animals may be subject. They are known in advance in each case, through one's knowledge of the animal's general disposition.

The steam vehicle is undoubtedly the safest of all automobiles in regard to the facilities for checking speed, being provided with brakes the same as the others, but also possessing the advantage of an elastic reverse, which may be very readily applied, without physical effort and without serious strain on the working mechanism, excepting only the sprocket chain, which is frequently too weak, and still more frequently too loosely adjusted. For fear of having the chain jump the sprocket wheel or mount its teeth and burst, the stopping action, even with steam vehicles, is essentially effected by the brake and by shutting off the steam feed rather than reversing it.

The question naturally arises whether

most absolute dependence upon the ıcy and integrity of the brakes of obiles is so highly reassuring as it een represented. It seems as if it be more reassuring if the qualities : brake were made the object of l, personal or legislative care than all solicitude for safety is concen- on the speed question. In the his- f automobile accidents it is noticea- owever, that those ascribed to faulty have as a rule been those in which tomobilists themselves have been the s, and in these the commonwealth e is not so vitally interested. On the hand, this fact, while it may contain ment of poetic justice, is readily ex- d, and still leaves a number of acci- of the more disquieting kind attrib- to the same cause. In the nature ıgs brakes could not be expected to ut so frequently at the precise mo- when somebody else is endangered, ıder other, more normal circum- s. They are also most likely to give hen put to some hard test, and in hard tests the automobilists will, of :, oftener indulge when going at high over country roads, with no other es in sight, than when in the midst ffic. The fact remains that every in course of time becomes defec- ınd that few automobilists find out that time has come, except by some f accident, trivial or serious.

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the point of steering the case stands ntly. The steering of automobiles der ordinary circumstances, far su- to and quicker than the steering rses, and when the road is slippery atomobilist is forewarned to drive . The quickness of automobile ıg (coupled with the fact that the of the vehicle continues to point d after the steering wheels have been l) involves a peculiar danger, how- from its tendency to confuse others, ne of no small consequence, though not be ascribed to the mechanical arities of automobiles. It will be d to under another classification. ding" and irregularities, due to that f steering gear which is jiggered by ughness of the road surface, are the pal mechanical factors in the gui- of automobiles which threaten the il traffic. The term "skidding" is imes used for the mere sideways g of front or rear wheels on slippery d, especially at turns, but in its l significance for automobiles it a certain action peculiar to vehicles are propelled through their rear , and provided with a differential to distribute motion unequally be- these rear wheels when required. As are features of nearly all automo- "skidding" is a deep seated evil, and frequently resulted in a very erratic of an automobile on wet asphalt or road conditions offered a better surface under one side of the vehicle than under the other. It is especially apt to occur when brakes are applied, and the only remedy lies in quick counteraction by means of the steering gear. While a slippery surface is one of the conditions for producing skidding, and gives some warning of what may happen, the effect may be quite unexpectedly violent and sudden without visible cause. The vehicle may run along over the road without showing any signs whatever of poor adhesion of the wheels, and when the brakes are applied the vehicle may be slewed completely around or may be turned into the curb or a lamppost or another vehicle. A perfectly satisfactory and exhaustive explanation of the action has never been given, but it is well known that it is aggravated by a non-locking steering mechanism, and by uneven distribution of loads, and that it does not occur with the few automobiles in which the front wheels, and not the rear wheels are the drivers. So long as rear driving is customary the best remedy lies in always providing irreversible steering, and in using tires which will not easily slip either sideways or rotatively. Skidding is undoubtedly a prolific source of accidents, and one against which the most careful driver cannot always guard. Speed reduction, unless carried to an impracticable extreme, also offers only small security against accidents from skidding, but does, of course, reduce the severity of the results. The necessity of locked or irreversible steering gear has long been recognized as an absolute requirement for fast travel. Nevertheless, the majority of American automobiles are equipped with lever steering of such construction that the position of the steering wheels may be changed by striking the side of a rut or a stone or brick on the road, dependence being placed in the driver to counteract such effect by main force applied to the steering lever. In cases when the driver's attention is relaxed this leads, of course, easily to an involuntary swerve of the vehicle, and the guiding lever may even be jerked out of the driver's hand. As when an automobile recently plunged over the edge of the Palisades, with its two occupants—and no other cause assigned for the occurrence—the results may be both serious and humorous, the latter because no one was badly hurt.

There are naturally a great many other mechanical factors bearing on the security of the general traffic. Everything relating to the strength and durability of the mechanism is of more or less importance, but automobiles do not differ radically from other vehicles in this respect. Even such accidents as may occur from leakage of gasoline and conflagrations resulting therefrom are serious chiefly to the automobilists themselves.

It need hardly be mentioned that the combination of high power and high gear which results in high speed capacity constitutes the mechanical factor which is commonly looked upon as the most dangerous of all, and it has even been proposed that legal restrictions be aimed at this point so as to render dangerous speed a physical impossibility. Those who have favored this proposition have not known how extremely wide must be the range of power development in an automobile to enable it to take its maximum load up the steepest grade at satisfactory speed as well as, on the other hand, to take its minimum load over level asphalt or macadam at very low speed. To span this difference in requirements the motor must be powerful—powerful enough to propel the vehicle at very high speed under ordinary circumstances. And to obtain this power with a practicable compass of space and weight, the motor must be of comparatively high engine speed. If now the high gears were omitted, it would be necessary to work the engine up to its top speed in order to obtain the very moderate vehicle speed contemplated by the reformers—and as a rule desirable. Nothing is more injurious to either a steam engine or a gasoline motor, however, than a surplus production of power which is not absorbed in the work, and it would therefore be necessary to operate the engine throttled down to an impracticably low limit, which in steam engines is uneconomical and in gasoline motors not yet within the accomplishments of the art. It is, in fact, well known that operators of gasoline vehicles who insist on using the low gears for slow travel quickly destroy their motors as well as their gears, simply because their motors continually generate more power than can be utilized for driving. More experienced drivers moderate their vehicle speed by the throttle while still employing the high gear, which under full power would produce high vehicle speed, and obtain more comfortable driving and better combustion of the attenuated charge, besides an important reduction of wear and tear. This could not be done if the wishes of the reformers were carried out. For the same reasons it may be questioned if it would be justifiable to go even only so far as the French Government has done in ordering that specially large figures (for identification) shall be carried by all automobiles capable of more than 30 kilometres per hour. At least, so far as gasoline vehicles are concerned, it holds true at present that the most moderate and careful automobilist could not be satisfied with a vehicle that is not mechanically capable of, say, 15 miles more per hour than the maximum speed contemplated by him for normal or sustained travel.

For steam vehicles, which at present are never equipped with more than one gear reduction, except in the heavy freight trucks, the same reasoning does not apply. The gear could very well be reduced so as to produce nothing more than the

actually desired traveling speed at full motor speed. They would have to be throttled down closer than at present for the same vehicle speed—but this involves no inconvenience and, with well built and well incased engines, not a serious loss of economy or greatly increased wear and tear. And for loads and hills the change would mean an actual gain in available power. While thus the plan of limiting the speed capacity of automobiles may be possible of realization, so far as steam vehicles are concerned, those who propose it persist in forgetting that all roads are not level and that the down grades upset all calculations in regard to what speed may be obtained with any given set of construction specifications. It would hardly be worth the while to interfere with the builder's judgment and the public's demands if, after all, the desired results could only be obtained on level stretches.

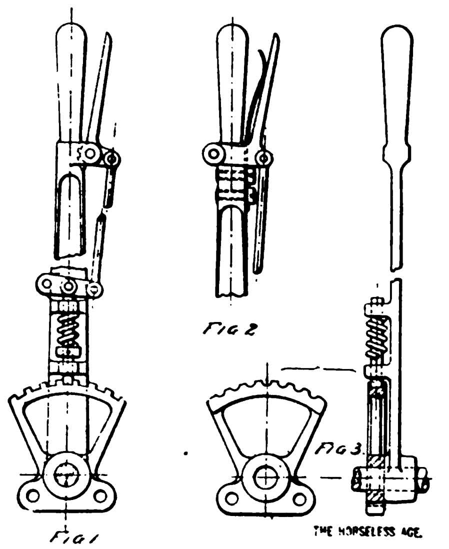
(To be continued.)

Details of Design.

By P. M. Heldt.

CONTROL LEVERS.

The speed control and reversing levers of automobiles usually operate on notched quadrants. A spring pressed pin or latch engages with the notches of the quadrant and locks the lever in position. There are two general designs of operating mechanism for the latch, illustrated in Figs. 1 and 2 respectively. In the former the latch is held in place by a small helical spring pressing against a collar on the latch at one end and against a lug projecting from



the lever and forming a guide for the latch on the other. The latch is pivoted at its upper end to a single armed lever, which connects by a link with the grip lever. The helical spring presses the latch directly, but when the latch is to be released the required pressure must be transmitted through the lever and link mechanism.

In the design of Fig. 2 the pressure required to force the latch into the notches is exerted by a flat spring bolted to the stem of the main lever and pressing the grip lever away from the grip. The design is quite similar to Fig. 1, except that the helical spring of the latter is dispensed with and a flat spring substituted.

Regarding the comparative merits of the two designs, it might appear that there was not much choice between the two, but the writer once had an experience which impressed him strongly with the superiority of design No. 2, in one respect at least. A lever of design No. 1 was used on an experimental wagon. The spring was rather stronger than required and the rod between the two small levers was made of a steel wire spoke which had been annealed at the ends, passed through holes at the ends of the levers and twisted around. The spoke was evidently not of the best material and the bending of the ends made them brittle. After the lever had been in use for some time the rod snapped and it was practically impossible to move the lever while running. Fortunately there were, as in most carriages, several means of shutting off the power from the vehicle, and no trouble was caused by the breakage, but a defect in construction was revealed.

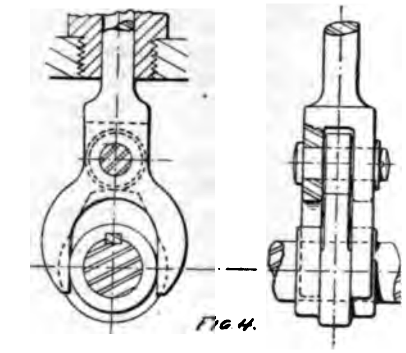
In design No. 2 there is very little pressure on the rod and pivot connections, and breakages in these parts are therefore extremely unlikely. If the spring should accidentally break that would not prevent operating the lever as usual. This design would therefore seem preferable, particularly in carriages in which there is no other quick and handy means of shutting off the power.

Fig. 3 shows a design of lever sometimes used for brakes and other purposes where there are no definite positions limited in number. The notches and the head of the pin are rounded and the pin moves from notch to notch without requiring a special releasing motion of the operator's hand. Simplicity of construction and operation is the chief point of this design.

PUSH ROD GUIDES.

In gasoline engines in which the exhaust valve is lifted through the intermediary of a push rod provided with a cam roller some means must be provided to keep the push rod from turning, in order to insure constant parallelism of the cam and roller axes. This requirement is not always easy to satisfy. Of course, the push rod might be made square in cross section and the guide broached out; but this is rather troublesome. Another method is to make a longitudinal slot through the wall of the guide at the upper end and put a pin in the push rod which moves up and down in this slot. This latter method is used to a considerable extent.

A French manufacturer constructs these push rods on the lines indicated in Fig. 4. The lower end of the push rod is forked to receive the roller and the prongs or branches of the fork are forked again and pass over the cam shaft or over the hub



of the cam. This arrangement not prevents turning of the push rod, but relieves it of a great deal of the ben stress due to the sudden interaction tween cam and cam roller.

A CRANK CASE LUBRICATING GAUG

One weak point of splash lubricati or has been that it is not easily r lated and that frequently too much put in the crank case, to avoid the n sity of frequent refilling. This resul getting too much oil into the cyli and the consequent evils of smoky exh dirty spark plugs, etc. An English the manufacturers of the Napier have lately made an improvement, i trated in Fig. 5, which permits the ator to keep the level of oil in the c

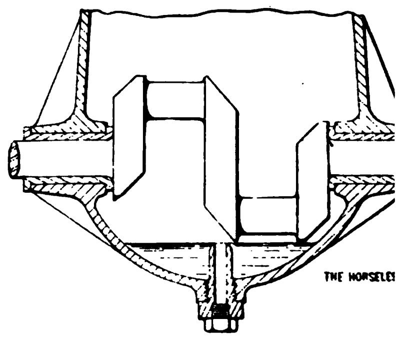


FIG. 5.

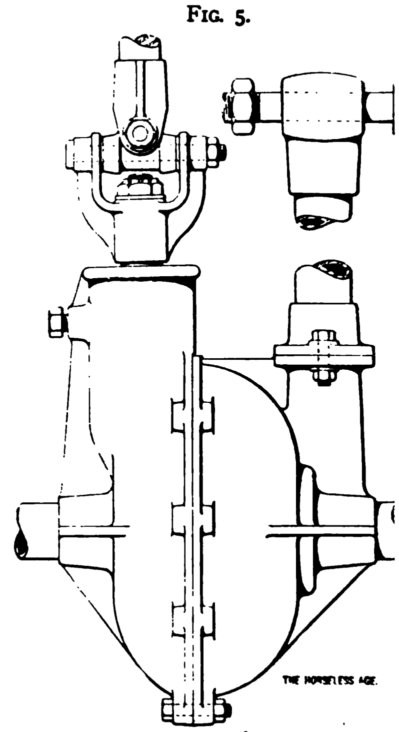


FIG. 6.

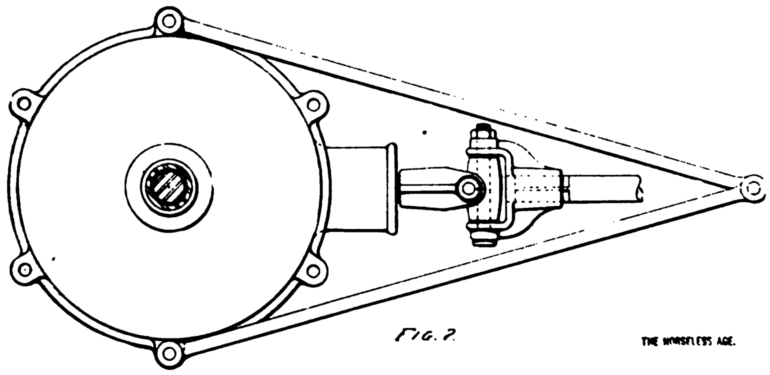


Fig. 2.

chamber practically constant. The lower part of the crank chamber is curved and a shouldered nipple is screwed into the wall of the chamber from below, extending up into the chamber even with the highest oil level permissible. The nipple is closed by a screw below. When it is desired to replenish the oil in the chamber the screw in the nipple is taken out and oil poured into the case through the filling opening until it runs out through the nipple. The screw of the nipple is then put back in place.

DRIVING GEAR BRACES FOR CHAINLESS DRIVES.

With bevel gear drive to the rear axle the transmission shaft generally contains two universal joints, and a bearing for the pinion shaft is located in the gear casing. This bearing takes up the reaction between the bevel gear and pinion and as a consequence the casing in which the bearing is located tends to turn in a direction opposite to that of the driving gear. The gear casing is, of course, made fast to the rear axle sleeves and is held by the latter, the spring blocks and the springs. Special means must be provided, however, to hold the case absolutely steady, to secure free running in all the bearings, these means taking the place of the chain tightener or distance rod with chain drive. In a number of vehicles, notably the Darracq, a tube is used for which a socket is provided in the casing, with its axis perpendicular to the rear axle centre line (Fig. 6). The tube has a pivot joint to a crossbar of the frame. The tube, when the vehicle is being driven, is subjected to a bending action and it relieves the rear axle from all bending stresses due to this cause. In this latter respect the brace here described is probably somewhat superior to that shown in Fig. 7, also used by some firms. In this case the gear casing is held by two rods, one fastening to it above and one below, and both at their other end to a crossbar of the frame. A saving in weight may be effected by the use of this latter construction.

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BEGINNERS PAGE.

Variable Transmission

Larger automobile engines generally run at normal speeds of 600 to 800 revolutions per minute. Now, when a vehicle with 34 inch wheels runs at 20 miles per hour, the wheels revolve only about 200 times a minute. The first requirement of a transmission gear for a gasoline vehicle is, then, that it shall reduce the speed of rotation from the motor shaft to the axle or driving wheels.

Now let us suppose that we mount, say, a 10 horse power engine running normally at 600 revolutions per minute on a vehicle weighing about a ton, and introduce gearing between the engine and driving wheels, which reduces the rotative speed three times. This vehicle might run nicely on level roads at 20 miles an hour. But if now we should come to a steep hill—say, 10 per cent.—we would find that the load was too much for the engine; it would slow down and stall.

Two remedies at once suggest themselves for this trouble: (1) To employ a stronger engine; (2) to gear the engine down lower. Both of these will, however, not entirely meet the difficulty. If, on the vehicle referred to above, an engine was to be used large enough to enable it to climb all hills encountered with the gear specified, it would have to be of enormous dimensions and weight. On the other hand, if the engine was geared down more the motor could, of course, exert a proportionally greater torque or turning effort on the wheels. If, for instance, the motor was geared down nine times instead of three—i. e., geared so that the driving wheels would make one revolution to nine of the motor—the motor in the above example might produce enough turning effort at the wheels to propel the vehicle up any ordinary hill. But in this case turning effort would be gained at the expense of speed, and our vehicle would run on the level at only one-third of 20, or about 7 miles an hour.

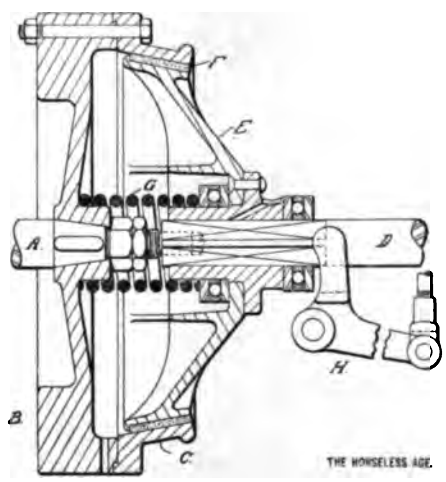


Fig. 1.

If we want both a good speed on the level and plenty tractive force on hills with a reasonably large engine, we must provide a variable transmission gear, enabling us to gear the motor high for running on the level and low for climbing hills, and this is what is done in all gasoline carriages.

Variable transmission gears are of different kinds. Some depend upon friction for the transmission of power, and others upon positive gearing. The former are generally continuously variable—that is, any desired ratio of speed reduction may be obtained between a higher and a lower limit—while with the latter only a few definite speed reductions can be obtained. By far a majority of variable transmission devices are of the latter kind.

Gasoline or explosion motors, unlike the other motors used for automobile propulsion, are not reversible. To enable the vehicle to run backward a reversing gear must be provided, and this gear is generally incorporated with the variable gear for forward motion. It may be stated here that the reversing gear is always a low gear, as it is never desirable to run the vehicle backward fast.

THE FRICTION CLUTCH.

It has been explained that the gasoline engine must be started up by hand, and a device must therefore be provided which admits of readily throwing the engine out of gear with the driving wheels of the vehicle, and throwing it in gear again while it is running. This device must allow of some slip, for if a fast running engine was suddenly coupled to a vehicle at rest such a severe shock would result that something would be almost certain to break.

A friction drive allows of a certain amount of slip between its members and requires no special device for alleviating shocks in starting. But with a positive gear transmission a special device is required, which in all American built carriages takes the form of a friction clutch. In some cases a separate friction clutch is used for every gear of the transmission, while in others one friction clutch serves for all the gears.

A friction clutch may be defined as a device by means of which two parts relatively movable to each other may be bound together by friction. There are three essen-

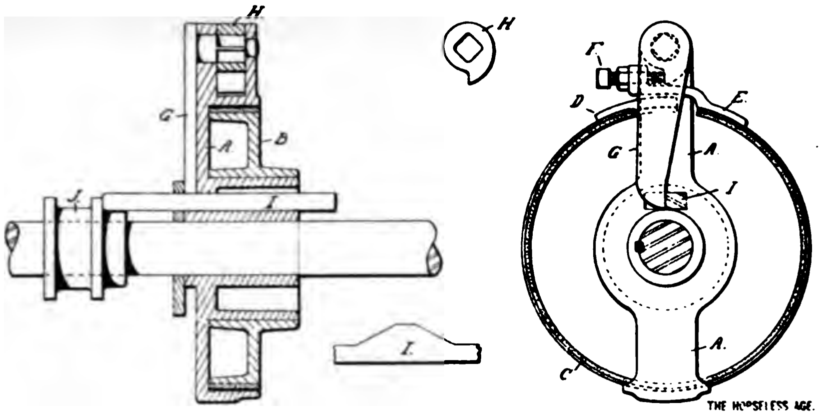


FIG. 2.

tially different types of construction, which will be described in succession.

THE CONICAL FRICTION CLUTCH

The conical friction clutch is the one mostly used when only a single clutch is employed for all the gears. Sometimes the engine flywheel forms one member of the clutch, while otherwise this member is bolted to the flywheel, as is the case in the clutch illustrated in Fig. 1.

Referring to Fig. 1, A is the motor crank shaft, to which is keyed the flywheel B. To this flywheel is bolted a ring C with an internal tapered surface, which is smoothly turned and serves as the friction surface.

The driven shaft D is arranged in line with the motor crank shaft and is counter bored at the end to receive a pin projecting from the crank shaft to keep it in line therewith. The end of the driven shaft is squared, and on this square portion is fastened the clutch member E, a dish shaped casting bolted to a hub. The outer conical surface of this clutch member is turned down and has applied to it a friction lining F of leather. The clutch member E is capable of sliding along the shaft, on the square portion thereof, and the two conical surfaces are pressed together by a strong coiled spring G, which tends to force the clutch member E farther on to the shaft D.

Normally, then, the spring G holds the two members of the clutch in engagement, and thereby the shaft D is driven from the shaft A. When it is desired to disconnect the shaft D from shaft A the spring G must be compressed, and this is accomplished by the operator by pressing on a foot lever, which is connected with the bell crank H. The bell crank presses against the hub of the clutch member E through the intermediary of a ball bearing, and the pressure of the spring against the cone E is also transmitted by a ball bearing, to avoid wear as much as possible. The operating mechanism of this kind of clutch is usually interconnected with the brake operating mechanism, as has already been explained. An advantage of the conical clutch over other forms resides in the fact that it is self adjusting for wear.

THE BAND CLUTCH.

The clutch illustrated in Fig. 2 possesses the advantage that it occupies a minimum space in the direction of its axis and can be very readily adjusted for wear. In this case the clutch does not serve to clutch two independent shafts together, but serves to clutch to the shaft a part which runs ordinarily free upon it.

The clutch comprises a bracket A, provided with a hub and keyed to the shaft, and a pulley B, also provided with a hub, and turning free on the hub of the bracket A. In practice a gear wheel or chain wheel is bolted to the pulley B, from which power is transmitted to a corresponding wheel on a parallel shaft when the clutch is in.

The pulley B is surrounded by a steel strap C, lined with leather. One end of this steel strap is fastened to the bracket B at D, and the other end has riveted to it a forged strap E provided with a set screw F and lock nut. It will be noticed that the two arms of the bracket B are of different length. The lower arm in the figure serves simply as a guide for the steel strap, while the upper one provides at its outer end a bearing for the operating lever G. This lever consists of a flat piece of steel formed integral with its pivot shaft. This shaft, as stated, has a bearing in the end of the bracket arm, which is forked. Between the two prongs of the fork the shaft is squared and has fastened to it a knuckle H. This knuckle engages with the set screw F in the strap E, and it will immediately be seen that if the lever G is turned around its pivot shaft in a left handed direction the steel strap C is tightened on the drum B and clutches the drum B to the bracket A. The set screw F can be so adjusted that only the slightest angular motion of lever G will cause the strap C to grip drum B.

In order to effect this angular motion of lever G a cam rod I is provided, which extends through a slot cut into the hub of the bracket B, parallel to the axis thereof. This cam is fastened to a sliding collar J, which can be shifted along the shaft in the ordinary way by means of a forked lever. When the raised cam surface is under the lever G the steel strip tightly grips the pulley B and power is transmitted from the shaft through the gear wheel or other transmission member fastened to the pulley B.

THE BLOCK CLUTCH.

The clutch illustrated in Fig. 3 comprises a drum A loose on the shaft B and a bracket C with a long hub, which is keyed to the shaft. Inside the drum are arranged two half rings of cast iron, D D. These half rings are provided at their middle and on their inner side with cylindrical guiding sleeves E E bored out to fit snugly over the arms of the bracket C. The ends of the half rings D are provided with lugs, which are threaded right and left handedly respectively, and the two half rings are connected by means of two studs F, threaded right and left at their two ends respectively and screwed into the lugs at the end of the rings. To the middle part of the studs, between the two rings, are clamped lever arms G G, and these are connected by links H H to the sliding collar I, which slides on the hub of the bracket C.

It is easily seen that when the sliding collar is moved toward the clutch the lever G is caused to slightly rotate around its pivot axis and turns the stud F, thereby forcing the two half rings apart. These half rings grip the drum A, and as they are carried along by the shaft, through the intermediary of the bracket C, which is keyed to the shaft, the drum A is now clutched to the shaft and transmits power from the shaft through a gear or other transmission part fastened to it. To adjust the clutch for wear the clamp screw S of the lever G is loosened, the stud F slightly turned in the hub of the lever and the clamp screw tightened again.

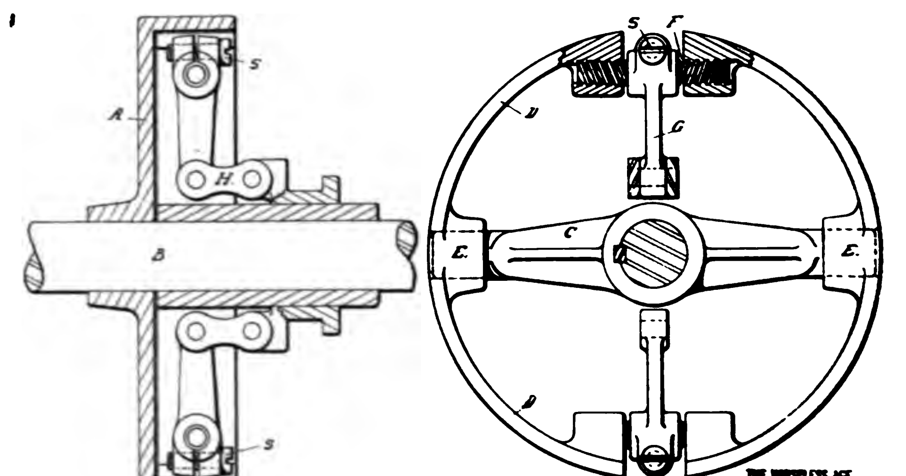


FIG. 3.

...COMMUNICATIONS...

The Insufficiency of Single Acting Brakes.

BOSTON, July 14.

Editor HORSELESS AGE:

This letter is intended as a warning to users of automobiles with single acting brakes.

My machine is of this class, and I consider that in hilly country it is little better than a death trap. On Saturday, July 5, while trying to climb a steep hill in New Hampshire, with a fairly heavy load, the machine stopped, and I was obliged to turn it backward against a steep bank on the side of the road, to prevent a disastrous run backward down the hill.

I could easily see at this time that if I had not had this bank to turn against, it would have been difficult to escape an accident, with possible loss of life, and I decided that next morning I would try the machine alone on this hill, to be sure that I could handle it safely. Accordingly, I ran the machine up the hill, climbed the steepest portion without difficulty, and then shut off the steam and started very slowly backward down the hill, with the brake on. As I knew would be the case, the brake failed to hold, after starting backward down this hill, and I turned on a little steam. Of course, the engine was set to go ahead. The carriage continued to go backward and I turned on more steam, probably opening the throttle two-thirds to three-quarters of the full opening. The boiler pressure was about 275 pounds.

The instant the engine got this increased steam it reversed automatically, and I started on a wild dash backward down the hill. Of course when I felt that the engine had reversed. I turned the carriage as quickly as possible against the steep bank mentioned earlier in this letter. This bank ran up from the road at an angle of between 30 and 45 degrees, and when my machine struck it running backward, it went completely upside down on this bank, entirely off the road, giving a vivid illustration of the force with which it must have struck.

I was thrown out the moment the rear wheels struck the bank, and escaped with but one very slight bruise, and very thankful to learn of the treachery of the engine under the circumstances related.

Exactly what happened in the engine I cannot explain technically. I simply know that the reverse lever was all right going up the hill, and that I did not touch it at any time during the experiment.

The sticks were smashed completely out of the back of my seat, but with this exception very little damage was done. After half an hour's work, with the assistance of a farmer, I righted the machine, which still had 150 pounds pressure left in the boiler, relit my fire, and started up the hill and back to the house where I was staying.

I am endeavoring now to get a double acting brake.

It is extremely difficult to understand the attitude of the manufacturers of my machine, who know full well from personal experience that the single acting brake which they furnish with their machines is not safe on hills, yet continue to manufacture them the same way, although very efficient double acting brakes are to be had at slightly greater expense.

I hope every user of a steam machine who reads this article will take it as a warning, and not endeavor to duplicate the experiment which I made, of turning on steam after his carriage has started backward down a hill. WALTER K. SHAW.

[Mr. Shaw's advice applies only to vehicles in which the reverse lever is not held positively in place. If the lever were locked on a notch sector, the engine could not possibly reverse automatically. Accidents similar to the one related by Mr. Shaw have been quite frequent, and a locking arrangement for the reverse lever must be considered essential to the safety of a steam carriage.—ED.]

Good Route from Philadelphia to to New York.

READING, Pa., July 14.

Editor HORSELESS AGE:

We are advised by a customer of ours that a most excellent road between New York and Philadelphia is by the way of Port Richmond, Bull's Head, Springfield to Tottenville, although the road from St. George to Tottenville is all that could be asked, and doubtless many other good ways of getting to Metuchen can be found. From Tottenville, ferry to Perth Amboy, thence to Metuchen, New Brunswick, Cranbury, Hightstown, White Horse, Bordentown, Mt. Holly, Camden. This route does not take one into Trenton, and is said to be in fine condition, excepting from Mt. Holly to Camden, where a trolley line is now being constructed.

This route was advised by a party who drives from New York to Philadelphia frequently as being the best one between the two cities. DURYEA POWER COMPANY.

C. E. Duryea.

The Motor Bicycle Endurance Contest.

BOSTON, July 14.

Editor HORSELESS AGE:

In Mr. Bramwell's article on the motor bicycle endurance contest I notice several errors which seem important enough to need correction.

He states that all of the machines were belt or rope driven. As a matter of fact nine chain machines started in the run, six of which finished. In view of the number of belt machines starting this fact cannot fail to be significant. He also states that none of the machines had any means of disconnecting the motor save by throwing off the belt. However, I noticed that six of the nine chain machines had means of instantly connecting and disconnecting the motor.

While there were a number of float feed carburetors in the run, the majority were of the mixing or generator valve type.

As to the matter of noisy exhaust, while undoubtedly many of the machines were noisy I noticed at least four whose exhaust could not be heard over 100 feet, and which would be called noiseless.

Considering the limitations imposed by the conditions under which a motor bicycle is operated it seems to me that any well informed rider of a motor cycle will bear me out in the statement that the criticism, that the electrical parts were too delicate and of too small a capacity, is not shown by experience or practice.

As to why the idler (presumably on belt driven machines) will have to be done away with is also not made clear.

In regard to the matter of the omission of the number 13, I will say that upon giving in my machine to be sealed I was given the number 14 by the officials without any comment on my part. In fact, the matter did not come to my notice until I saw Mr. Bramwell's article. Furthermore, if I had been given the number 13 I should have received the same without protest. As there are a great many people of education and intelligence who have, to say the least, a strong sentiment against the omitted number, it seems to me that the committee in charge are entitled to commendation for their consideration of the possible feelings of anyone who might have received that number.

Here is a list of the chain driven machines: Cleveland, 1; Columbia, 1; Rambler, 1; Crescent, 1; Royal, 2; Indian, 3. All of these except the last named were equipped with means of instantly connecting or disconnecting the motor.

HAROLD H. BROWN.

The Gordon Bennett Cup Winner.

LONDON, July 1.

Editor HORSELESS AGE:

We have much pleasure in sending you by same post a photograph of the racing Napier car which has just won the Gordon Bennett race. S. F. Edge and Mr. Napier are seated on board. This is a 40 horse power car, with four speeds, gear driven, and is of British manufacture throughout. We thought perhaps it would interest the readers of THE HORSELESS AGE.

THE MOTOR POWER COMPANY, LTD.

Explosive Engine Queries.

July 7.

Editor HORSELESS AGE:

Please answer in THE HORSELESS AGE if the following proportions are right for a gasoline engine for an automobile: Cylinders, 4½ inches in diameter, 6 inches

stroke; valves, 1¾ inches opening; lift, ¼ inch; flywheel, 22 inches diameter; run, 2x2 inches. The engine is to be run at 700 revolutions per minute and is to be an opposed cylinder engine with cranks 180° apart. What horse power should such an engine give, and would it be strong enough for a 1,500 pound automobile with a gear 2 and 6 to 1? H. E. DUPERRET.

[The proportions are all right; the engine should give 8 to 9 brake horse power, and if it gives this power will be sufficient for a 1,500 pound machine, but gear ratios of 2 and 6 to 1 are too high. If you had 32 inch wheels this would give you vehicle speeds for an engine speed of 700 revolutions per minute of about 32 and 11 miles per hour. If you gear the machine down 3 and 9 to 1 we believe you will do better.—ED.]

Selecting a Motor Cycle.

Editor HORSELESS AGE:

I had a great desire for the past two years to own a self propelled vehicle, and as the lowest priced automobiles were beyond my reach I soon arrived at the conclusion that the only type of machine I could possess was a motor cycle. I have a large acquaintance in the bicycle and automobile trade and every one of my friends I approached on the subject of getting a motor cycle talked discouragingly. One said: "Why, a motor cycle —what good is it?" Another said: "Did you ever see one that would run, or, rather, one that you can depend on?" Still another said: "They are all right when they run."

The above comments, with lots more like them, were very discouraging to a beginner, but I pondered carefully over the remark: "They are all right when they run," and I said to myself: "It must then be only a question of picking out the best on the market and keeping the same in running condition, if such a thing is possible." Having seen a number of different motor cycles on the roads around New York city, most of which, to my surprise, were running when I saw them. I started in to see which ones generally ran and which ones did not. Most every rider of a motor cycle whom I approached, when asked how he liked his machine said they were fine—never had any trouble to speak of (outside of a few little things like defective spark plugs, batteries running down, carburetors not working, defective lubrication, frames, etc., buckling or breaking, etc.). All this sounded very strange to a layman and I still thought that motor cycles were all right when they ran.

I finally decided that experience is the best teacher. So a few months ago I invested in a 1902 model motor bicycle which, in my judgment, I thought was the best on the market. I do not care to mention its name, as this letter is not an advertisement for the machine, but want to give a true account of my selection and experience as a motor cycle rider. Will say that the machine has a motor of about 2 horse power, mounted in the seat, just a twisted rawhide belt being used to transmit the power in the usual way. The motor is supplied with gas through a vaporizer and a small three cell battery, and an induction coil and plug are used for ignition. I have only had the machine a short time, but long enough, I think, to bring out any weak points.

The machine has been ridden to date close on to 1,000 miles. The batteries are in fair and the machine in excellent condition. This machine has been ridden on all kinds of roads and at all speeds, and the only trouble I have had so far is one cracked spark plug, which I soon discovered one afternoon when on a 50 mile ride. Having an extra insulator and some asbestos it was an easy matter to replace the broken insulator with another one. The second trouble, after the machine had run 256 miles, was due to defective insulation on the circuit breaker contact screw. I made new fibre bushings for same and have had no further trouble up to the present time with the ignition. These are the only troubles I have had up to date, outside of the lubricating oil tank leaking. This leaked when the machine reached me from the factory. The motor, vaporizer, etc., have given me no trouble at all, and I am more than pleased with the machine and consider a modern up to date motor cycle as reliable as an ordinary bicycle if it is handled by a person who will use a little common sense and judgment. I have very little time for riding a machine—a half a day Sunday, when I take a 50 or 75 mile run without any trouble, and a hour three or four times each week before breakfast, when I cover from 13 to 20 miles. My machine is controlled by one lever, which opens or closes the exhaust valve and retards or increases the speed. The operation is very simple and I have put dozens of people on my machine, bicycle riders who never saw a motor cycle, and they have no trouble in handling the same and all want one, but the present price of the machine seems a little too high for the average man. F. B. W.

Technical Automobile Association.

DETROIT, Mich., July 8.

Editor HORSELESS AGE:

Your suggestion of a technical automobile association seems to me one which, if carried out, should be productive of the greatest good, and I think small power driven boats should be included under the term "automobiles."

I know of no art that seems at once so capable of, and so much in need of, systematic rational investigation. No one would assert that his judgment was anything but fallible, therefore the field within which pure unguided judgment must be exercised should be narrowed as much as possible. At the best, the field for the expression of taste, character and individual judgment is sufficiently extended. Why should we waste our time and energy discussing matters that may be determined beyond doubt or that have been already settled, or why should time, energy and money be wasted in experiments, without having all the light possible on the subject?

The clearing up of doubtful subjects generally involves a very great deal of labor and time—how much could only be appreciated by one having had experience in that line. When it is cleared up, its first expression is almost always in a form complicated and unintelligible to the majority. This work must and ought to be done. How can we expect anyone to subject himself to the most severe labor and self denial without hope of appreciation, profit or reward of any kind? The approval of one's colleagues in such an organization as you suggest would be a strong incentive to the generous enthusiasm of the engineer.

Further, an individual generally gets only partial results; he looks at a subject from his individual point of view. A general discussion would enlarge the views of all.

I think also the suggestion of your correspondent to have it affiliated with the commercial organization is good.

On the one hand, the spirit of commercialism ought not to be narrow and cynical, and on the other the practical end of science should not be for a moment lost sight of.

When once an obscure point is cleared up, then as a second natural step it should be sought to put the subject in simple and generally accessible language.

Professor Perry remarks that there is no subject which cannot be put into quite ordinary language. Yet putting it in such language involves much work, skill, and without something akin to genius, this end will not be attained after all. This organization should see that the "eloquent orator, the wise counselor, and the cunning artificer" do not disappear from our midst or lack appreciation. Why have foreign nations excelled us in this art? Almost for the first time in an engineering art. Let us organize and let mutual acquaintance inspire mutual confidence and respect, and that generous incentive to efforts that the Almighty crowns with success.

In closing let me call your attention to an abstract from a letter from the most glorious age of scientific achievement, by Michael Farraday to James Clerk Maxwell:

"There is one thing I would be glad to ask you: When a mathematician engaged in investigating physical actions and results has arrived at his conclusions, may they not be expressed in common language as fully, clearly and definitely as in mathematical formulæ? If so, would it not be a great boon to such as I to express them so?—translating them out of their hiero-

glyphics, that we also might work upon them by experiment. I think it must be so, because I have always found that you could convey to me a perfectly clear idea of your conclusions, which, though they may give me no full understanding of the steps of your process, give me the results neither above nor below the truth, and so clear in character that I can think and work from them. If this be possible, would it not be a good thing if mathematicians, working on these subjects, were to give us the results in this popular, useful, working state, as well as in that which is their own and proper to them?" E. J. STODDARD.

Wire Wheels in the Paris-Vienna Race.

UTICA, N. Y., July 8.

Editor HORSELESS AGE:

Did anybody notice that the Renault car, first at the winning post in the Paris-Vienna race, was equipped with wire wheels?

Also the Darracqs, finishing fourth, sixth and seventh in the same race?

Most of these cars were driven by their designers and manufacturers, who have had ample experience and opportunity for judging of the merits of wire and wood wheels, and who, beyond question, considered their own safety of paramount importance.

And these people formerly all used wood wheels—still, in this instance, they used wire! WESTON-MOTT COMPANY,
F. G. Mott, Jr.

Difference Between Igniters and Batteries.

Editor HORSELESS AGE:

As I am the owner of a hydrocarbon gasoline motor and know of the troubles that those have who own a gasoline motor, I deem it necessary to say a few words to my motor brethren in regard to their ignition troubles. A gasoline motor that is well constructed will generally run and give good satisfaction where the ignition is good, with a spark strong enough to ignite the charge. With batteries that are weak there may be a spark which may be discernible with the naked eye, but is insufficient to give a spark with life enough to ignite the charge, therefore many a good motor has been thrown aside just on account of the ignition troubles caused by poor batteries, and as I have had a great deal of experience with different kinds of batteries, I find that after a little use they will lie down and refuse to work, therefore the poor unfortunate one who has his motor driven by batteries and is stalled by the roadside will find that nine cases out of every ten is caused by poor ignition. This is nearly the only trouble that I ever had with my wagon while using batteries, but as I have discarded the batteries entirely and use nothing but an igniter I find that I have no more troubles from poor ignitions, and that my motor runs continually until stopped by turning off the switch, and as I have used my igniter on all kinds of roads and in all kinds of weather, both up hill and down, through sand and mud, I have never had it refuse to work, therefore it has been a great satisfaction to me. Now I want to say a few words to my motor brethren who have had their share of sorrows and troubles with batteries: See that your sparking points are made from good material and get an igniter, place it in your machine, and you will find that your sorrows and troubles are ended from being stalled upon the road from poor ignition. ANDREW W. REXFORD.

Continuous Combustion Engines.

PARIS, Tex., July 8.

Editor HORSELESS AGE:

Why is the continuous combustion engine not developed more? My question has reference to a pet theory of mine, which may be described about as follows: The engine is to be supplied with an air compressor, which compresses the air to a higher pressure than that of the gases in combustion chamber. We will say the engine is to have electric ignition, and a small chamber containing an incandescent platinum strip, the latter to be used after the engine is well heated up.

In the first place the engine is started by compressed air; then, at the proper point, a small amount of compressed air with the proper amount of gasoline is sprayed into it, and is exploded, and as the stroke continues this compressed mixture is constantly admitted until the proper point of cut off is reached. After expanding the gases the exhaust begins, and is completed during the return stroke, continuing until the point is reached when charge is admitted again.

If you can imagine a single acting, boilerless engine with three cylinders, made reversible, with combustible gas substituted for steam, you will understand what I mean.

What is the difficulty that would be encountered with an engine working on this principle? I am certain there is some difficulty, or else we would have had an ideal engine long ago.

With a small tank of compressed air the engine is ready to go any time, is reversible, and, in fact, has all the good qualities of the steam engine without the bad ones of the boiler. C. E. BASSANO.

[To carry an air compressor and an air tank is objectionable, and to be able to reverse complicated valve gearing and igniter mechanism would probably be required. The great complication would not be justified, since what is wanted more than anything else is a simple engine that will not get out of order. A variable gear would be required anyhow, and it does not greatly increase the complication of same to add a reversing gear. —ED.]

Heavy Oil Burners.

CAMBORNE, England.

Editor HORSELESS AGE:

I have just received the Kerosene number, and I think that a few remarks on the matter contributed by others cannot fail to be of interest.

First, to consider Mr. Lucke's paper.

I found this intensely interesting, as I have myself traversed all the ground he goes over. I did not think, however, when I wrote the papers which appear under my name in THE AGE that this class of petroleum combustion was of sufficient interest to makers of automobiles, so that I did not describe my experiments.

My own experience agrees accurately with Mr. Lucke's in that vaporizing burners for crude petroleum are no use. The Wells burner is the only one I know and that, when using mixtures containing crude petroleum, has to be cleared out with a reamer after eight hours' use.

Starting from this basis I followed with surprising accuracy—or, perhaps, I should say, preceded, as the experiments were conducted in the fall of '99—Mr. Lucke's footsteps. I tried the wick arrangement and very soon found that a plain wick would not burn enough oil. There is no need to describe accurately all the experiments, but the final burner produced may be of interest. It has been made by my company for metallurgical purposes in

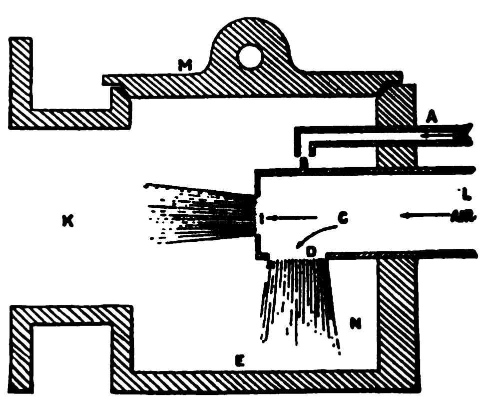


FIG. 1.

connection with small brass and iron melting furnaces, and furnaces for assaying, for the past three years.

Fig. 1 is an illustration. Mr. Lucke will perceive that it is, I believe, one step beyond the burners he describes.

Like him I use a mixture of oil and air impinging on a pile of broken brick at very close quarters. I shortly found, however, that this was inconvenient in practice, as it was not handy to have the pile of broken stone or brick in the furnace. I therefore only allowed about two-fifths of the air to strike the "wick" in company with the whole of the oil. This gave rise to a heavy, yellow, smoky flame, but no deposit of coke whatever, as that deposit was formed just under the orifice

J and burnt off at once. This smoky flame left the fire pot or combustion chamber by the hole E, where it met the blast of air (the remaining three-fifths) from the hole B and was blown into the furnace. The result is perfect combustion at all powers within the capacity. As Mr. Lucke says, this class of apparatus will burn with practically any oil, and any air pressure exceeding something like one-half inch water gauge. I should perhaps add that this is the only apparatus described which is patented in the United States.

If it were desired to use this burner for internal combustion engines (for which it was never intended, by the way), it would be necessary to feed the oil and air under the same pressure, which, up to about 25 pounds per square inch, would insure the relative proportions remaining constant at all pressures. This would be quite easy, provided the pressure of air used was great as compared with the pressure due to the actual static head of oil, which will usually be about 1 pound per square inch.

It should be added that the temperature produced by this burner depends on the air pressure, though it will burn at almost any pressure. Thus one-half inch pressure will only give a temperature sufficient to melt cast iron, while about 24 inches, or one pound per square inch, will readily melt tool steel, and three or four pounds will melt mild steel and run wrought iron.

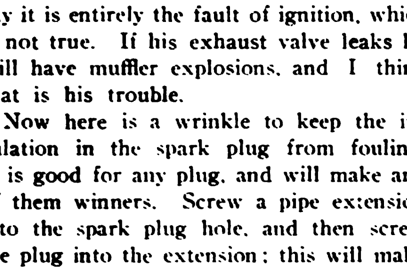
J. V. S. BICKFORD.

Spark Plug Wrinkle.

Editor HORSELESS AGE:

In your issue of July 2 P. G. Hubert complains of muffler explosions, and you say it is entirely the fault of ignition, which is not true. If his exhaust valve leaks he will have muffler explosions, and I think that is his trouble.

Now here is a wrinkle to keep the insulation in the spark plug from fouling. It is good for any plug, and will make any of them winners. Screw a pipe extension into the spark plug hole, and then screw the plug into the extension; this will make a plug stay clean, and will not need cleaning once in three months. I have been using this scheme for six months on a bicycle motor and a carriage motor, and have not cleaned or renewed the plug in that time. Here is what I mean by a pipe



extension. It can be had at any plumbing shop for 5 cents.

JESSE S. KEPLER.

Tire Filling by Wooden Blocks.

NORWALK, Conn., July 14.

Editor HORSELESS AGE:

I was almost as much astonished upon reading, in your issue of July 9, the grand exposé of my tire filling, by W. S. Southworth, as I would have been upon seeing lightning from a clear sky.

I have filled and returned many tires from all parts of the country, mostly by express, c. o. d., with privilege of testing, and I have never received or heard a word of complaint from anyone, but have had the second order from one of my customers. I have experimented with a good many substances as filling, but found none as good as this, and one other, viz., the substance known as Tuck's packing. This will do the work very satisfactorily, but it is much heavier and hasn't much more resiliency than mine. It alone costs about twice as much as I charge for mine with the labor thrown in.

Mr. Southworth closes by saying: "It is impossible to believe that Dr. Baldwin can think tires so filled have any value." That is not true, for they have a value. I am using them now on a wagon with good springs, and have used them for the past year, during winter on frozen ground, and they did not loosen a nut, except occasionally a lug fastening. If we can ride comfortably in steel tired wagons, I don't understand why we cannot travel comfortably with the same springs, and a rubber tire filled with rubber with a wooden core.

If Mr. Southworth had written me that he was dissatisfied with the filling I would have refunded his money rather than have had his scurrilous article appear in your columns, but he did not give me a chance. I gave him just what I advertised: A solid tire that would not flatten with long, continued use.

I fail to see where there is any fraud in using a wooden core in a filling, when we frequently see recommended in your columns a new tire for automobiles composed exclusively of wooden blocks placed endwise on the rim of the wheels.

I did not consider it necessary to mention in my advertisement that a tire filled with my filling would not be as resilient as one filled with air. In regard to his accusation that I returned him tires of a different make, I am quite sure he is mistaken, but if I did send one of another kind it was a mistake on my part. However, he did not complain that it was inferior to the ones he sent. He might have omitted the insinuation inasmuch as he discarded the tires, and if I did make a mistake, the one I sent will bring just as much for old rubber as his.

I think Mr. Southworth made a mistake in putting on a full set at once. If he had used one or two at a time, he would not have noticed the difference so much. Tires usually fail to hold air one at a time, and I would suggest to automobilists that while one is being filled they purchase a new tire, so that they will have the use of their vehicle. Then when the next one fails they can use the filled tire.

Now, in closing, I maintain that tires filled in this manner will give very satisfactory service to the owners, who must otherwise throw them away. The price is as low as it can possibly be placed, consistent with good work, and there is a good deal of work about it. Those who can less afford to throw them away than Mr. Southworth will do well to send them on, and I will give them their money's worth.

A. H. BALDWIN, M. D.

The Dangers of Horse Traffic.

The following communication appeared in a recent issue of *Harper's Weekly*, and is notable for the reason, among others, that it hails from the State prominent for its horses, and which has no automobile industry:

"I have spent much of a long life in the observation of horses. I have reared them, broken them, trained them, ridden them, and driven them in every form from the plough to the four in hand. The result of these years of study is summed up in one sentence: I believe the horse to be part maniac and part idiot. Every horse at some time in his life develops into a homicidal maniac. I believe any man who trusts himself or his family to the power of a horse, stronger than himself, to be lacking in common sense and wholly devoid of ordinary prudence. I have driven one commonplace horse every other day for six years over the same road, and then had him go crazy and try to kill himself and me because a leaf fluttered down in front of him. I have known scores of horses, apparently trustworthy, apparently creatures of routine, go wild and insane over equally regular and recurring phenomena. No amount of observation can tell when the brute will break out. One mare took two generations of children to school over the same quiet road, and then in her nineteenth year went crazy because a rooster crowed alongside the road. She killed two of the children. If anyone can tell me of one good reason why man should trust a horse, I should be glad to know.

"G. A. A."

The Fate of the English Sparrow.

It is stated by Professor Frank M. Chapman, ornithologist of the American Museum of Natural History, that one of the results of the general introduction of automobiles in New York city will be the disappearance of the English sparrow. The number of sparrows in the city is limited by the available food supply. The sparrows mostly pick their food from street sweepings. As the horses disappear the streets become cleaner, and the food supply for the sparrows diminishes. The effect of the passing of the street car horse on the number of sparrows is already noticeable.

...OUR... FOREIGN EXCHANGES

The Paris-Vienna Race.

At no previous automobile race has there been such a manifestation of public interest as in the case of the Paris-Vienna race. The start took place, as usual, at an extremely early hour and twelve miles outside of Paris, and those who wanted to get a view of the start were therefore required to give up a night's sleep, if they lived or stayed in Paris. And thousands gladly made this sacrifice to view the exciting scene. From 10 p. m. on the night before the start the road leading from the Bois de Vincennes, to the east of Paris, to the plains of Champigny was animated with a continuous procession of automobiles, occupied in many instances by passengers in number beyond their normal seating capacity, and of bicycles. The last night trains had brought multitudes of sightseers and the automobile squad of the Vincennes troops had received leave for the night to witness the start.

The weather was superb. The moon shone brightly and not a cloud obscured the clear sky. At the starting point extensive preparations had been made. Stands had been erected from which victuals were sold; bicycle storage had been provided in the neighboring fields. Trucks and delivery wagons were on hand with cans of oil, alcohol and gasoline, which it was sought to sell to the automobilists. The impression of the whole scene was most picturesque, illuminated, as it was, by alcohol lamps hung from the trees.

The starting point was passed by many non-entered vehicles from midnight to 3 p. m., the occupants of which were evidently intent upon stationing themselves somewhere along the route where they might expect to see the vehicles go by at the limit of their speed, but shortly before the starting began the route was barred.

Of the 208 entries in the racing section 147 started, and of these twenty-five vehicles employed alcohol. It has been estimated that the value of the vehicles that started was in the aggregate about $600,000. The vehicles were of French, English, German and Austrian construction and were operated by chauffeurs of various nationalities, including American. In a race of this kind the drivers run exceptional risks, both personal and material (damage suits), and a number of them made attempts to insure themselves against these risks. The following terms were offered them by the insurance companies: For the four days of the race the companies asked a premium of $200 to insure a participant against accidents to outsiders for which he might be held responsible, and for $40 they issued a life insurance policy to the machinist who accompanied the vehicle. They refused altogether to insure the vehicles against accident, and would issue no other than a life insurance policy to the drivers.

The first to start were the entries in the Gordon Bennett Cup Race, which was to be run between Champigny and Innsbruck, in Austria, a distance of 560 miles, but only 365 miles over which there was actual racing, no racing being allowed in Switzerland. With regard to the neutralization of the part of the route in Swiss territory, it is reported on good authority that the Swiss authorities refused to sanction the racing, but a report from Paris states that the Automobile Club of France had not sought the sanction of the Swiss authorities considering it dangerous to race over the Swiss roads. There were six entries for the Gordon Bennett cup race, three French—Girardot, Fournier and De Knyff—and three English—Grahame White, Herbert Austion and Arthur Callahan. The Englishmen were to drive 45 h. p. Wolseley racing cars. None of them appeared, however, and at the last moment S. F. Edge, with a Napier racer, appeared to take their place and compete for the cup for England. Grahame White states that he was prevented from starting by the crankshaft of his motor breaking not far from the starting point. According to the rules of this special contest the three French machines were painted blue and the English red.

About an hour after the first vehicle was sent on its way a special train left for Belfort, which carried many journalists and others following the race. The railroad at times skirts the public road, and at such places the passengers on the train often caught a glimpse of one of the racers. The train was about even with Fournier, who was in the lead, when the latter suddenly stopped and threw up his hands as a signal that something serious had happened. A gear shaft had broken, which put this vehicle hors de combat. De Knyff was the first to pass Fournier, and then came the two Farmans, De Caters, Jarrott, Pinson, Teste, Edge and Renault.

All along the route from Paris to Belfort there were signs of extraordinary popular interest in the event. Necessarily full warning had been given in all districts as to the time of the race, and those who came to view it knew well enough to beware of approaching too close to the flying cars. As it was, a mechanic was killed on the course, but he was seated in a non-racing vehicle; the accident that caused his death being due to an unsuccessful attempt to avoid a farm wagon.

AT BELFORT.

The finish of the first stage was just outside Belfort on top of a small hill, from which a fine view could be had of the approach. Elaborate arrangements had been made to avoid accidents. The road was roped off on both sides, and police and soldiers were engaged in keeping back the large crowd that had assembled in spite of the hot weather.

The arrival of the first racer, De Knyff, was announced by a bugle at about 10:40. He had covered the distance of 253 miles in 7 hours 11 minutes gross time, but the neutralized stretches required over two hours.

As M. de Knyff was running with alcohol, for which he had carried out slight modifications to his carburetor and engine, he won the alcohol cup offered by Prince d'Arenberg for the first vehicle arriving at Belfort with this fuel. De Knyff declared that he had not met with the slightest trouble on the road, and had not even been obliged to stop for punctured tires. Several other competitors spoke highly of the way in which the tires (Continentals and Michelins) had come out of the ordeal, for they had rarely been put to a more trying test. On finishing they were quite hot. About twenty minutes after the arrival of De Knyff the bugles announced the second car, and Henry Farman stopped at the control, followed nine minutes afterward by his brother Maurice, with C. Jarrott close in the rear, though, calculating the starting times, Mr. Jarrott was third, and he said that as Henry Farman did not stay the full time at all the controls, he thought that he had secured the second position. Mr. Jarrott declared that his run was remarkably uneventful. The only trouble he experienced was the dust. He tried repeatedly to pass the cars that preceded him, but finding himself blinded with the dust, and unable to distinguish either the road or the car, he prudently contented himself with following at a respectful distance.

Among the accidents in this stage may be mentioned the fatal one to the driver of a non-entered Gobron-Brillie vehicle, and rather serious injuries to Caillois, who drove a 16 horse power Peugeot.

All the first six vehicles to arrive were Panhards, and this stage proved a triumph for that firm. L. Renault showed up in the first flight with a Renault voiturette specially built for this race, and then came a Darracq, the Mercedes of M. Zborowski, and a Darracq running with alcohol. The next was S. F. Edge, and then came the first Mors, driven by Baron de Caters. Among the other cars finishing were a C. G. V., driven by Giraud, two or three of the Gobron-Brillié-Nagants.

The Serpollet vehicles were using alcohol, and although they did not show very high speed they came through very well. The Mors vehicles did not do véry well, for of ten starters only four finished. It is true that Fournier maintained the lead for 150 miles, and the vehicles, therefore, undoubtedly possess exceptional speed qualities. The Darracqs did very well.

THE SECOND DAY.

The second day was comparatively uneventful, for the machines were required to proceed slowly through Switzerland, and "events" come with speed.

De Knyff, the two Farmans, Jarrott, Pinson, Teste, and the fast contingent generally got away first at about 4 a. m. It

took just over three hours to send them all off. There was a dense crowd at Belfort, and indeed the route throughout was lined with the Swiss folk, who gathered in large numbers to see the vehicles pass. A speed limit of 15 miles an hour was strictly imposed by the police, who did not hesitate to stop drivers who offended by overstepping it. Between Bâsle and Breuss a halt was called, during which the Government's instructions to the racers were expounded by the officials.

De Knyff was also the first to reach the end of this stage at about 3 p. m. He was followed by the two Farmans. All complained about the dust which, together with the heat, made it rather uncomfortable for the racers

THE THIRD DAY.

On Saturday the Gordon Bennett cup race was to be decided, in which only De Knyff and Edge remained to compete. De Knyff had steadily maintained the lead, while Edge was a considerable distance behind, and the hopes of the French to retain the cup were high.

This day's racing, Bregenz to Salzburg (231 miles), involving as it did the passage of the Arlberg, was the most exciting of the whole course, and had been dubbed an obstacle race Twenty miles from Bregenz De Knyff was leading, as he was also at 70, being followed by the two Farmans, Teste and Jarrott It was near Telfs, 60 miles or so from the goal at Innsbruck, with the cup almost within his grasp, that De Knyff met with his downfall. He broke his differential and had the mortification of seeing Edge fly past him. Mr Edge, too, did not escape trouble. Owing either to the roughness of the road or to the fact that his glasses were dimmed by the mist, his Napier left the road and ran into a river, from which it was only extricated with the utmost difficulty. After this he met with no more severe incidents, and sailed in at Innsbruck the winner of the cup.

All of the participants who went through this stage had a most exciting time in going down the Arlberg, as the roads were in a shocking condition, and the very steep and dangerous descents and sudden twists and bends of the road made driving at speed little less than a nightmare. The fastest time was made by Baron de Forest on his Mercedes, 4 hours 39 minutes 50 seconds. Next came Marcel Renault nearly an hour later, although he did fastest light car time, and the performance of the Baron de Forest, considering the course, was nothing less than remarkable. The third man was Henry Farman on his big Panhard, followed closely by Count Zborowski and Edmond. The fastest in the voiturette class was Guillaume, while Osmont did the best among the motor cycles, though his time was very poor.

At Salzburg, as at the end of the other stages, there were many Frenchmen who had traveled there by train, and when a Mercedes machine arrived first, instead of the expected Panhards, they were disappointed to say the least, and the welcome accorded the Baron was not very enthusiastic. Edge arrived twenty-first, and Jarrott also finished (fifty-one) in spite of the accident above mentioned.

Many contestants dropped out on Saturday. A Darracq machine, as already reported, ran off a bridge and fell 300 feet deep into a torrent. This happened when the machine was descending the Arlberg at a high rate of speed and struck a rock, which caused it to swerve from its course. Zborowski's vehicle caught fire about here, but he extinguished it and drove on. Louis Renault and De Caters had a collision near Innsbruck, and were compelled to stop for repairs. Eighty vehicles reached the end of this stage, Salzburg.

THE LAST DAY.

The last stage, Salzburg-Vienna, covers a distance of 210 miles, and was covered by Marcel Renault in the shortest time, 5 hours 15 minutes 5 seconds net. The starters from Salzburg numbered seventy-seven. The end of the race was at the trotting track in the Prater, Vienna. However, the last part of the road, from Florisdorf on, was neutralized, and was to be covered at legal speed, while the final mile in front of the grand stands was to be raced again to afford excitement for the crowds on the grand stands. It had been calculated that the first arrival might be expected at about 2 o'clock, and at 2:18 Marcel Renault hove in sight, appearing first as a small cloud of dust in the distance, but approaching rapidly and flying past at a terrific rate. The Marseillaise was struck up by the band, and the crowds cheered vociferously. The second to arrive was Count Zborowski in a 40 horse power Mercedes, and his time would have been next to that of Renault but for the fact that, owing to a violation of the rules in Switzerland, forty minutes was added to his net time. The two Farmans were third and fourth, and the next three arrivals were 24 horse power Darracq machines, one of which used alcohol.

Renault violated the rules of the contest by failing to slow down at Florisdorf and

THE 40 HORSE POWER NAPIER WINNER OF THE GORDON BENNETT CUP

racing on to the Prater. It was hinted that he would be disqualified, but much to the surprise of many of the non-French contestants no notice was taken of this breach of the rules, and he was declared the winner.

Out of 138 starters 55, or about 40 per cent. arrived in Vienna. By classes the starters and arrivals were as follows: Heavy racers, 42 starters, 22 arrivals (51 per cent.); light vehicles, 62 starters, 27 arrivals (43 per cent.); voiturettes, 15 starters, 4 arrivals (27 per cent.); motor tricycles, 5 starters, 1 arrival (20 per cent.); motor bicycles, 14 starters, 1 arrival (7 per cent.).

By makes (considering only the prominent firms) the results were as follows:

Name.	Starters.	Arrivals.
Mercedes	4 or 5	2
Panhard	18	12
Mors	10	2
Serpollet	5	5
Darracq	9	6
Charron	2	0
Peugeot	4	1
Richard	5	2
Clement	8	4
Decauville	8	2
Renault	7	4

These figures are from an unofficial table of results in *L'Auto-Vélo.*

The official classification of the first ten arrivals at Vienna is as follows:

1. Marcel Renault (Renault light carriage), 25h. 51m. 47 4-5s.
2. Henri Farman (Panhard-Levassor), 26h. 48m. 29 2-50s.
3. Edmond (Darracq light carriage), 26h. 42m. 16 1-5s.
4. Maurice Farman (Panhard-Levassor), 26h. 48m. 29 2-5s.
5. Count Zborowski (Mercedes), 26h. 54m. 3-5s.
6. Teste (Panhard-Levassor), 27h. 31m. 8 4-5s.
7. Baras (Darracq light carriage), 27h. 35m. 52s.
8. Hemery (Darracq light carriage), 27h. 52m. 38 3-5s.
9. Marcellin (Darracq light carriage), 28h. 5m. 3s.
10. Crawhez (Panhard-Levassor), 28h. 29m. 20s.

THE TOURISTS' EXCURSION.

In the excitement of the race the tourists' excursion has been almost lost sight of and very little has appeared about it in the press, except accounts of some accidents which occurred in Switzerland.

We have already noted the start of the tourists' section from Paris on June 19, and how the number of participants rapidly fell off. This was probably due to the fact that many of the entrants really did not intend to run.

Dunbar Wright, of the A. C. A., drove an 8 horse power Mors (No. 21). On the way to Neufchatel he crashed into a bank and overturned, but fortunately without any serious personal injury. At Lucerne an 8 horse power Panhard, driven by M. Dufour, caught fire and was burned near the picturesque old bridge of the Swiss city. No one was injured in the accident. M. Dufour took a photo of the burning vehicle, his coolness being due to the fact that he was insured.

While the weather had been fine at the start, it was rainy during the run through Switzerland.

At Interlaken the arrival of the tourists was made the occasion of festivities, and what with banquets and illuminations the excursion had become a great triumph. After staying over the Sunday at Interlaken, the tourists continued with good roads on to Ragatz, through magnificent mountain scenery, but with gradients that fully tested the climbing powers of the vehicles. All the way the excursionists were received enthusiastically by the populace, who threw flowers into the vehicles, and there was no sign of the hostility the Swiss have been credited with displaying toward automobiles.

A more or less serious accident occurred near Berne. M. Brantsen de Rhoderond, who drove a 28 horse power Mercedes, accompanied by his wife and chauffeur, was driving along at a high speed when he caught up to a peasant who had just turned into the road. The latter jumped out of his wagon, so the account runs, to hold his horses by the head, but jumped out on the wrong side, and was knocked down by the automobile. A later account states that the accident was not as serious as originally reported, and that the peasant had contented himself with 1,000 francs damages. The automobile collided with the horse vehicle and was overturned, the owner sustaining light personal injuries.

The total number of vehicles to reach Ragatz within official time was thirty-four, and thirty-one reached Innsbruck, the showing made being quite good considering that it was raining nearly all the while since the vehicles entered Switzerland.

At Klagenfurt the tourists were enthusiastically welcomed—they were well received everywhere—and entertained at a banquet of which, in all, 350 hosts and guests partook. Owing to the snow the tourists' route had to be altered somewhat, so as to avoid the high ground; this took them past Anet, Morat and Frauenkappein, places not included in the original itinerary. On approaching Vienna a *déjeûner* was enjoyed at Semmering, as well as the society of the members of the Austrian Automobile Club. The entry into Vienna was triumphant; partly perhaps because many mistook them for the racers. Flowers were flung, hats and handkerchiefs were waved, and there was was a procession in which some fifty Austrian automobilists joined, together with thirty-five of the vehicles which had completed the journey. The arrivals included Madame Lockert, who also participated in the Paris-Berlin tourists' excursion, but was less successful then.

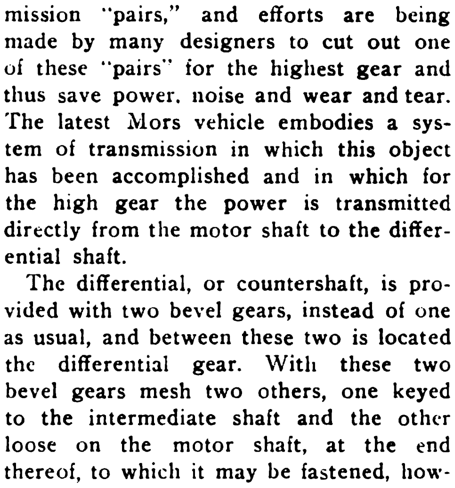
On Monday the vehicles that had completed the course were on exhibition at the Prater, and on Tuesday there were a series of track races, in which twenty-three vehicles of the racing section and six of the touring section partook. On Friday (July 4) some twenty vehicles went on a tour from Vienna to Budapest and Bosnia-Herzegovina. Among the party were M. Huguet and Baron de Forest, who drove a 40 horse power Mercedes in the race.

Mors Direct Transmission and Body Spring Dashpots.

One vital objection to the ordinary shifting gear system of transmission, as used in the Panhard and many other vehicles, is that on all the gears the power must be transmitted through three transmission "pairs," and efforts are being made by many designers to cut out one of these "pairs" for the highest gear and thus save power, noise and wear and tear. The latest Mors vehicle embodies a system of transmission in which this object has been accomplished and in which for the high gear the power is transmitted directly from the motor shaft to the differential shaft.

The differential, or countershaft, is provided with two bevel gears, instead of one as usual, and between these two is located the differential gear. With these two bevel gears mesh two others, one keyed to the intermediate shaft and the other loose on the motor shaft, at the end thereof, to which it may be fastened, however, by means of a positive clutch. For the first three speeds power is transmitted to the differential shaft through the intermediate shaft, as usual, but when the shifting gears are shifted to the left beyond the position of the third speed the positive clutch is thrown in and the power is transmitted through the bevel gear on the motor shaft.

Between the spring blocks and the frame of the new Mors vehicle are fitted



MORS SPRING BUFFER.

a sort of dashpots, composed of a cast iron cylinder, in which air is compressed as the piston therein moves back and forth conforming to the relative motion of axle and frame or to the play of the spring. It is stated in *La Locomotion*, to

which we are indebted for these particulars, that with this arrangement one may run at high speed, with eyes shut, without being aware of running on a cobblestone pavement. The passengers are perfectly comfortable and all vibrations, which so quickly wear out the machinery, are avoided. And even a large economy in tire expense results, as the wheels, instead of jumping off the ground and slipping and grinding, always remain in contact with the same. We admit being unable to see how these advantages can be obtained by the means described and we strongly suspect that the only object of the dashpots is to prevent breaking of the springs. The small unevennesses of the road are taken care of by the pneumatic tires and the larger ones by the springs and there would thus seem to be no need for any additional shock absorbing devices. However, the following condition may make the use of the dashpots very desirable: It is known that with springs the deflection is approximately proportional to the deflecting force. If, then, light flexible springs are used they will deflect excessively for heavy shocks, while if stiff springs are used they would not be sensitive enough for light shocks. The best elastic suspension medium would seem to be one in which the play or deflection increases with the shock, but not in proportion therewith. This is the case with the dashpot. For light shocks the air pressure in the dashpot will affect the deflection and the pressure on the springs but little, but when the shocks are very severe the dashpots will take up a great deal of their force and limit the deflection, thus preventing breaking of the springs.

Some Special Features of the Daimler System.

The illustration below, from *Der Motorwagen*, represents the Daimler alcohol motor, as built by the Motorfahrzeug und Motoren Fabrik Berlin. The double float carburetor was illustrated and described in our last issue. Another notable feature is the pressure fuel feed, employed for the alcohol, the regular fuel, only. This same system is employed by the Daimler Manufacturing Company in this country with gasoline. A small dome is fastened to the top of the gasoline tank, from which a tube leads to the exhaust pipe near the exhaust valve. Part of the exhaust gases thus pass to the fuel tank and exert a pressure on the surface of the alcohol In order that the pressure in the fuel tank may not rise too high an automatic valve is located in the pipe or tube conveying the exhaust gases to the tank at 6. Just below this valve is another one, also automatic, which opens and closes as the pressure in the exhaust pipe rises and falls, once for each explosion. The gases are also caused to pass through a wire gauze sieve, 7, for the purpose, it is said, of preventing dirt passing to the alcohol tank. A small cock in the dome on the fuel tank permits of verifying that the fuel is under pressure and of relieving the pressure. The alcohol tank is filled through an opening on the left, in which a sieve, 1, is arranged. A detail worth noting is that a small hollow casting is fastened to the tank below, forming a pocket. The fuel is drawn from this pocket by the tube leading to the carburetor and a plug in the pocket permits of completely draining the tank.

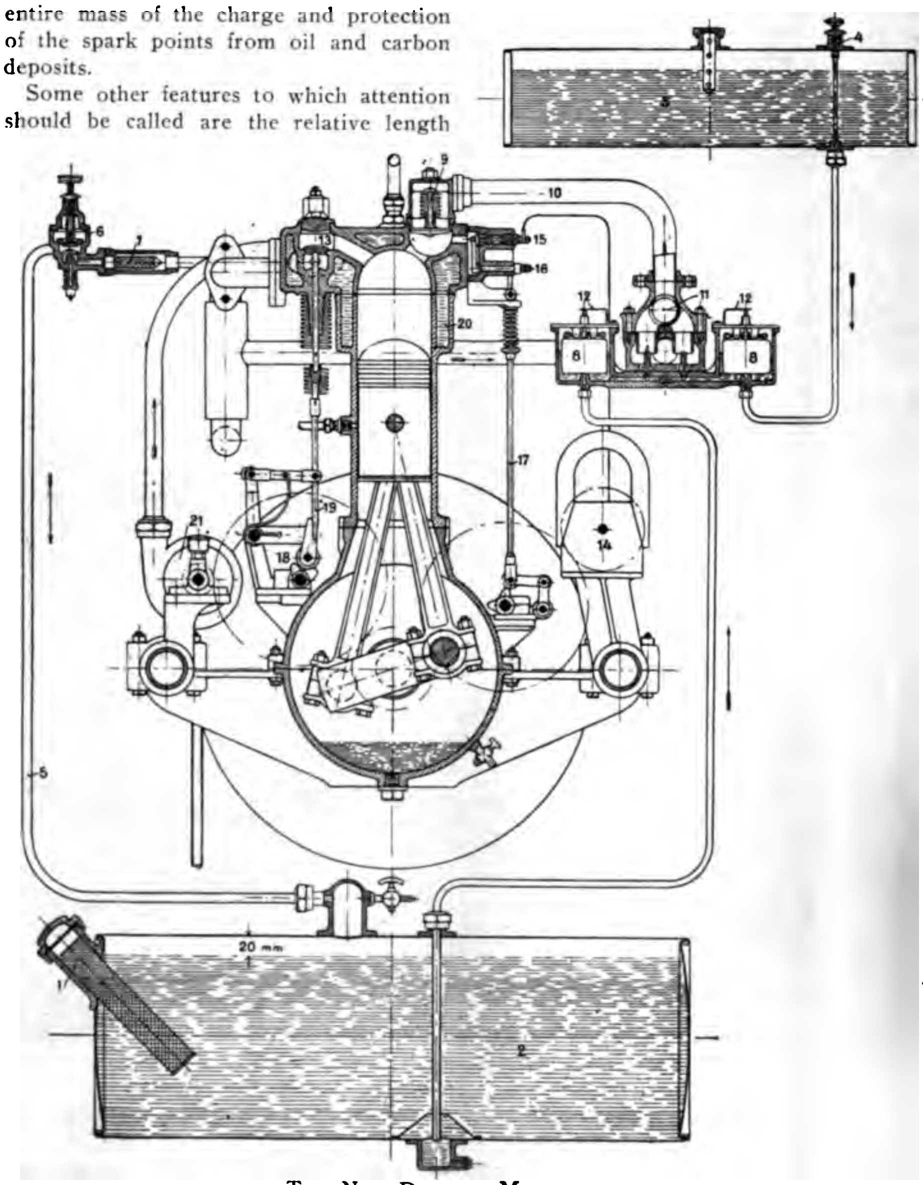
It will be noticed that the piston head is made bulging outward. The object of this construction is to reduce the compression space and to get the high compression required with alcohol. This is the only change made in the motor proper to adapt it to the use of alcohol.

As is also the practice in the Cannstadt Daimler Works, the exhaust and admission valves are located on opposite sides of the cylinders. Primary ignition with magneto generator is used. The spark points are placed in a separate chamber communicating with the cylinder through a small passage. The objects of this construction are more rapid ignition of the entire mass of the charge and protection of the spark points from oil and carbon deposits.

Some other features to which attention should be called are the relative length of the piston, that the water jacket extends only little below the compression space, the provision of a cock in the crank case for gauging the amount of oil in same, the governor mechanism on the left and the igniter operating mechanism on the right.

A New English Automobile Bill.

A bill has been introduced into the House of Commons to render compulsory the registration of all motor vehicles and the exhibition upon them of some means of identification. It is suggested that only a nominal fee shall be charged, as automobilists, in common with all other carriage owners, contribute to the excise in respect of their vehicles. The bill is receiving the support of the Automobile Club and of many motoring Members of Parliament, for it not only proposes what would seem to be something of a hardship, but it also includes a clause abolishing the present authorized speed limit, which by statute is 14 miles an hour, and, by order of the Local Government Board, has been



The New Daimler Motor.

further reduced to 12 miles an hour. The bill, therefore, is of the nature of a compromise. The automobilist desires greater freedom, and requests that he should be treated like other carriage users under the highway acts, which treat of danger, but not in terms of so many miles per hour. In return he is ready to proclaim his identity broadcast.

"Rapid" Circuit Breakers.

In a recent issue we described the spark plug manufactured by the "Rapid" Accumulatoren und Motoren-Werke, of Schöneberg-Berlin. The same firm manufactures the other parts of ignition outfits, particularly a considerable variety of circuit breakers, a number of which will here be described.

Fig. 1 represents a circuit breaker of the trembler form (to be used with a coil without buzzer). It has platinum iridium contact points. The contact is made and broken by means of a cam with a raised cam surface and the contact spring is provided at its outer end with a cam roller instead of the more common "nose."

Fig. 2 shows a sliding contact for use with a coil with buzzer and a double cylinder engine. The circuit breaker of Fig. 1 is mounted on a circular base and can easily be provided with a cover, but no such provision seems to have been made in the apparatus shown in Fig. 2.

In sliding contacts of the type so far used and as shown in Fig. 2, no means are provided for adjusting the spring and the contact pressure therefor varies as the contacts become worn and as the spring loses some of its elasticity, as deflecting springs are apt to do in the course of time. This leads to unpleasant annoyances, and to remedy this defect the circuit breaker of Fig. 3 has been designed in which a coiled spring is used. The latter can be adjusted as the sliding surface wears away.

The *Motor Union* is appealing against the decision of the Chester magistrates in connection with a case in which a member of the Manchester Automobile Club was summoned for having crossed over a bridge in Cheshire at a greater speed than 6 miles an hour, contrary to a bylaw.

The Association Générale Automobile of France have decided to take part in the 650 miles Endurance Test of the A. C. G. B. I. next September.

On the occasion of the English Coronation, John Thornycroft, F. R. S., the well known builder of heavy steam wagons, has been honored with knighthood.

The Automobile Club, of Bordeaux, France, is arranging an automobile tour through the Pyrenees from August 20 to 26. Two days will be spent on Spanish territory.

The Liverpool Cycle and Motor Show for 1903 will be held from the 3d to 7th of February. It will take place in the St. George's Hall under the auspices of the Automobile Club, as on the last occasion.

In England, as here, the medical profession is deeply interested in automobilism, and an exhibition of automobiles is being arranged in connection with the visit of the British Medical Association to Manchester.

An eyewitness of the start in the Paris-Vienna race comments upon the difficulty of starting the big motors. Foxhall Keene's vehicle stood for some time outside the Automobile Club, while those in charge tried all they knew to get it going. Eventually it was pushed across the Place de la Concorde by a large and good natured crowd, and in this ignominious manner induced to start.

A Decauville gasoline carriage started from the general post office, Edinburgh, early on June 19, and arrived in London the same day late at night. The whole of this distance, some 400 miles, was accomplished in 20 hours 40 minutes, or at the rate of about 20 miles an hour. What is more important, the run was made from start to finish without one single stop. It is this feature which makes the performance so noteworthy.

The Motor Power Company, Limited, have just delivered a 9 horse power Napier car to the British War Office.

The motor bicycle race organized annually by *L'Auto-Velo*, will take place at the Paris Parc des Princes at the end of this month.

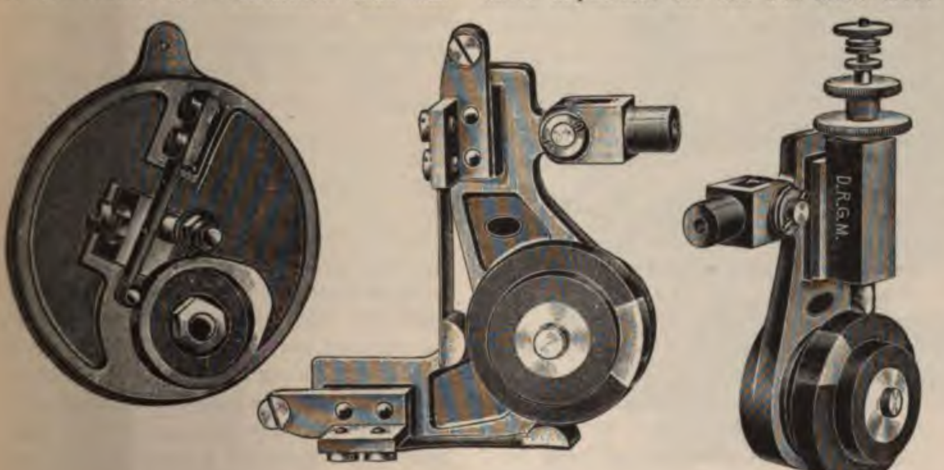
The Association Générale de L'Automobile has voted 100 francs to Sig. Guglielminetti, to aid him in pursuing his work on allaying the dust on roads nuisance.

According to a report from abroad, the Société Falconnet-Perodeaud, Choisy-le-Roi, France, has secured from the Consolidated Rubber Tire Company, New York, the exclusive selling agency for France for the Kelly solid rubber tires.

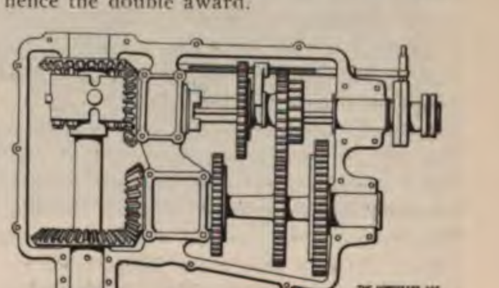
The following method of blacking small articles of polished brass is taken from the *American Machinist:* Make a strong solution of nitrate of silver in one dish and of nitrate of copper in another. Mix the two together and plunge the brass into it. Now heat the brass evenly until the required degree of blackness is obtained.

In the Paris-Vienna race the Continental tires came out most successfully. In the heavy vehicle class the first, third, fourth and fifth places were taken by vehicles fitted with these tires. These were the vehicles of Count Zborowski (40 horse power Mercedes, 978 kilogs.), Baron de Forest (40 horse power Mercedes, 980 kilogs.), M. Maurice Farman (70 horse power Panhard, 986 kilogs.), and M. Teste (70 horse power Panhard, 994 kilogs.). S. F. Edge's 40 horse power Napier was shod with Dunlop tires.

The French Society of Civil Engineers has awarded the Giffard prize of 5,000 francs to Messrs. L. Perisse and L. Turgan. The prize is awarded for the best paper presented to the society, dealing with the general subiect of automobiles and traction vehicles in the present state of the industry, with a view to their special utilization for passenger transportation, the requirements of commerce and heavy trucking in city and country. The prize is awarded every three years and no award was made in 1899; hence the double award.



RAPID CIRCUIT BREAKER, FIGS. 1, 2 AND 3.



MORS CHANGE GEAR, SEE PAGE 69.

LESSONS OF THE ∴ ROAD ∴

The Long Sad Story of an Inlet Valve.

ALBERT L. CLOUGH.

This little piece of history, which, however, seems tragic enough to the victim of it, as it caused him several weeks' loss of use of his carriage, is recounted in detail, not for any great interest which it possesses in itself, but merely as an example of the small but annoying and elusive "bug," which constantly lies in wait to mar the pleasure of the motorist. Possibly this experience as narrated may help a fellow sufferer from the same cause.

One of the inlet valves of my double cylinder gasoline motor was leaky from the start, and knowing the loss of power that this leak must entail, I decided to remedy it. It was natural to suppose that merely a grinding in with emery or quartz powder, would put an end to the trouble. The valve was accordingly taken off, and this was carefully done. The valve was contained in a cast iron housing, provided with a long guide for the stem, and was intended to be bolted to the cylinder head on two studs passing through the corners of the diamond shaped flange of the valve housing. What was my astonishment, when, after a new gasket had been fitted and the flange bolted on, I found it leaking worse than ever. So badly, indeed, as to allow of almost no compression in the cylinder. The valve was taken off again and ground, and once more put in place with the same result. My machinist, by some chance, happened to notice that if the nuts, which secured the flange of the valve housing, were not set up tight, the valve was almost tight. But of course the gasket would immediately blow out if we tried to run in this condition. We then developed the theory that the surface of the valve flange, which was intended to seat on the cylinder head, was not perfectly flat, through warping or imperfect machining, and that the strain occasioned by setting the nuts up tight, distorted the valve seat and caused the leak. The valve housing was accordingly taken off again, the valve taken out and the housing put on an arbor in a lathe, and the bearing surface of the flange carefully squared off. Supposing our troubles to be at an end, we put the thing together again with a new gasket and turned the crank, expecting to feel a magnificent compression, but the valve leaked as badly as ever. The suggestion was then immediately made that the flange about the inlet port in the cylinder head had not been machined correctly, and we put red lead on the inlet valve flange, and tried to mark the high places and work them off with a scraper to a fit. After a good many hours labor under discouraging conditions, and finding that no improvement resulted, we decided to have the cylinder head inlet port flange planed off. The cylinder head was accordingly taken off, at the expense of the packing, which had previously been made water tight only after long labor; the studs were taken off and the head was placed in a planer and carefully trued off, with the confident expectation that our troubles would immediately be over, but when the valve was put on again there was no improvement.

Gaskets of every conceivable kind were tried in vain, and we racked our brains in a futile endeavor to assign some cause for the difficulty. The two studs which secured the flange then fell under suspicion, the thought occurring to us that they might not be perfectly perpendicular to the surfaces and thus cause an unequal strain on the flange when the nuts were secured. They seemed to be all right, however, and we had the nuts carefully squared off so that they would bear equally all round, but there was no improvement. A large washer was put under each of the nuts, which secured the flange, with the idea that it might equalize the strain and thus prevent distortion of the valve seat, but this idea was of as little value as its predecessors. We discovered that if a little "shimming" was placed under the extreme ends of the flange and the nuts were set up, the valve would be almost perfectly tight, so it was packed in this way, and the carriage taken out for a run. After a few miles, the packing blew out and the pleasant job presented itself of packing it on the road, which was done in such fashion as to carry the carriage home successfully.

In more superstitious days, we should have doubtless concluded that the thing was bewitched, but instead my machinist and I, after several sleepless nights, decided that the trouble must be due to physical causes, which probably were to be found in a blow hole or very hard place in the casting, causing a distortion when strain was applied to it. The casting, however, looked perfectly sound to the most careful scrutiny. At last my machinist, who is bright and fertile in expedients, took a couple of monkey wrenches, and, attaching one to each end of the flange, pulled them forcibly together, when a tiny crack appeared in the flange near the stem guide. The valve, which was perfectly tight when one blew into it in its normal state, leaked freely when this crack was opened by the strain of the wrenches. The "hoodoo" had at last been hunted down. It only remained to wire to the factory for a new housing, giving the pattern number, with the likelihood of receiving the wrong part or one which would not fit, despite the statement that "our carriages are constructed to gauge on a system of interchangeable parts."

This bad valve housing will be responsible for about a month's loss of use of the carriage. As to what the bill will be, I do not like to think. If I had a weak heart I should be afraid of the consequences of a perusal of that lengthy and portentous document. If it were not that I consider this a remarkably good example of "the little rift within the lute, which sometimes makes the music mute" (the music being the exhaust in this case), I should not burden the columns of THE HORSELESS AGE with so many details of personal reminiscence of a not agreeable character, but it is only when the noble army of automobile users freely and frankly unburden themselves of their troubles as at a great "experience meeting," that we shall become able to forestall and exterminate these "bugs" that do sooner or later work themselves into the best regulated stables.

The Brighton Beach Races.

A circular received from the racing committee of the Long Island Automobile Club states that these races will be held with the sanction and under the racing rules of the American Automobile Association.

The course is a regulation one mile track, 80 feet in width. The starting hour of the races will be 2 o'clock p. m. If the number of entries warrant so doing, heats will be run off in the forenoon, beginning at 11 o'clock.

Vehicles to be in racing trim. No restriction as to number of passengers or types.

If the day of the race is a stormy one, race will be postponed to the first pleasant day.

Vehicles will make a flying start. There will be no prizes awarded in case of walk-overs. No second prize unless four start.

The entrance fee will be $10, except for the 10 and 25 mile events, for which the fee will be $20. The contestants must be familiar with the racing rules of the American Automobile Association, a copy of which will be mailed each contestant upon receipt of entry. Entries close at 6 p. m., Saturday, August 16, with A. R. Pardington, Long Island Automobile Club, Post Office box 242, Brooklyn, N. Y.

Good Roads Meeting at Atlantic City.

The League of American Wheelmen send out the following notice:

"On July 16, 17, 18, 19 the first real convention for the advancement of the highway improvement cause will be held at Atlantic City, N. J. All the prominent good roads associations of both the East and West will be represented, together with the League of American Wheelmen, automobile associations and the riders and drivers of the country. On the opening day of the 16th, both afternoon and evening, speeches by persons not only prominent in good roads movements but in the world of science, letters and business will take up the subject from various points of view. There will be afternoon and evening sessions, and the extremely backward condition of the United States in this one vital necessity for

civilized peoples will be illustrated by means of the stereopticon and compared with the fine highways of Europe and other portions of the world. The hauler of heavy loads, whether he be agriculturist or have manufacturing or business interests, will be represented as they are most vitally interested. The user of the highway for touring and for recreation will also have a large delegation, and plans will be presented which will certainly meet with acceptance, and which will be backed by the strongest influences in the United States to push this country from the most backward in the list of civilized communities to a place at the top, which it has already gained in almost every other line."

Trials to Be Made With Steel Roads.

We have received the following communication:

"The steel roads committee of the Automobile Club of America is making rapid progress in its work and through its energy, together with the liberality of the United States Steel Corporation and the hearty co-operation of the city authorities, a thorough demonstration will very soon be made in this city of the merits of the steel highway system under various conditions of service.

"The chief difficulty was to get the special shape of steel roller; none of the outside mills were willing to furnish it, or even take an order for regular sizes requiring prompt delivery, but when Chairman Seligman, of the committee, met President Schwab, he found him in full sympathy with the movement, and ready not only to furnish the special forms and deliver them promptly, but to contribute the steel for a mile of road as a free gift.

"General Stone, the designer of the proposed road, has already conferred with the Steel Corporation's experts on the details of construction, and the material will be delivered in six weeks.

"President Cantor has shown a warm interest in the affair, and by his direction Chief Engineer Olney is to recommend suitable locations for sections of the road. It is intended to place one in the heavy trucking region down town, another in a street of general travel and a third on a suburban earth road.

"The track plates will be 12 inches wide and will be laid on special foundations of broken stone.

"An English engineer, who recently inspected the steel road at Valencia, in Spain, reports in the highest praise of it in every particular. This road has been in use for ten years."

A booklet has been received from the Link Belt Engineering Company, of Nicetown, Philadelphia, dealing with the Renold high speed silent driving chain. A copy can be had upon application.

NEW VEHICLES AND PARTS.

The Spencer Steam Delivery Wagon.

In the design of the Spencer delivery wagon many departures from conventional construction have been made. The axles are of solid metal instead of being made up of tubes and fittings, and the rear wheels are driven by separate chains. There is almost an entire absence of automatic devices, and no water glass is employed.

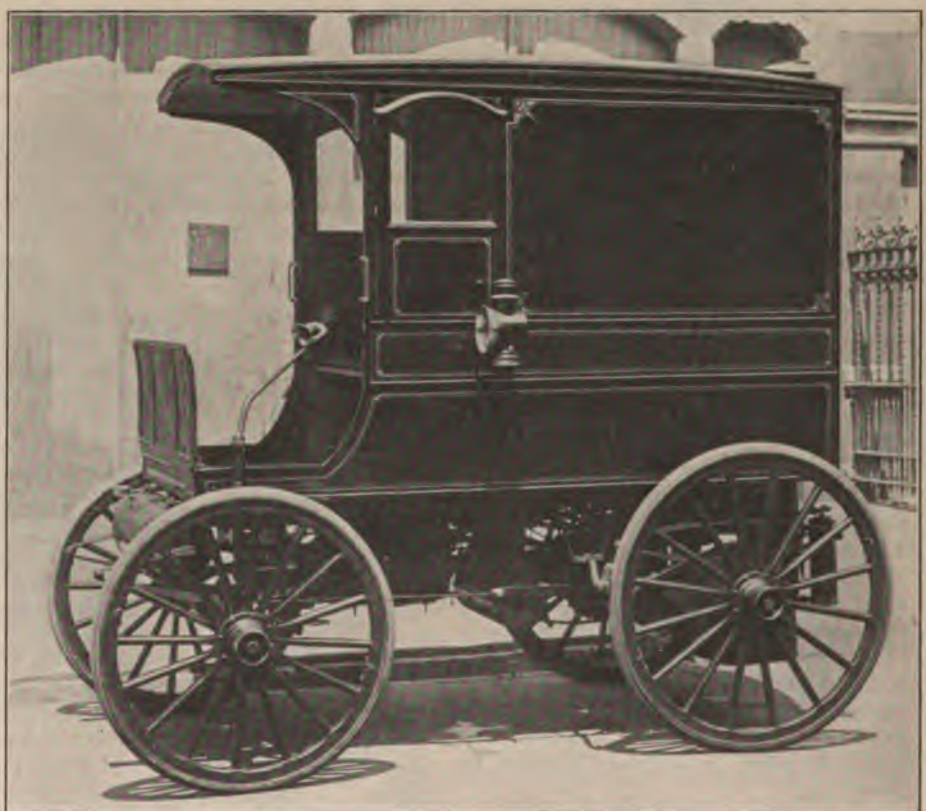
The wheel base of the wagon is 6 feet and the tread 4 feet 8 inches. The wheels are larger than those used on the majority of light goods vehicles; in front they are shod with 39x2½ inch and in the rear with 43x2½ inch Firestone solid rubber tires. All wheel bearings are plain and (bronze) bushed. The wheels have artillery hubs and fourteen spokes each. Spring steel reaches of a rectangular cross section prevent the axles from spreading. The ends of the reaches adjoining the rear axle are forked. Block bearings are bolted to these forks. By shifting these bearings forward the side driving chains may be taken up. The latter are ⅝x1½ inch Baldwin block chains and run in sheet metal dustproof cases. The engine drives a countershaft by means of a ½x1 5-16 inch block chain and makes two turns to one of the latter and six revolutions to one of the driving wheels. The equalizing gear is a Brown-Lipe (spur type), and is located on the countershaft.

THE ENGINE.

There are a number of features about the engine that deserve comment. It is a vertical, single acting, four-cylinder motor, with a bore of 2½ inches and 4 inches stroke, and is capable of developing 6 brake horse power with 150 pounds of steam. Splash lubrication is employed, the crank cases being of sheet brass and oil tight. No stuffing boxes are used, and only two slide valves are required for steam distribution. All the engine bearings are plain and of generous proportions. The air and boiler feed pumps are driven by an eccentric, which is keyed to the countershaft. Hence they run at a very moderate speed and are, therefore, more reliable than high speed pumps connected up to the engine's cross head.

THE BOILER.

A number of patents have been granted to the designer on the boiler and its automatic feed water regulator. The boiler is of the water tube type and is composed of eight shells, each of which has a circulating coil surrounding it. All the shells are joined together on top and bottom, making a compact nest of individual boilers. Circulation in the boiler is rapid, it is claimed. To remove all mud from it a blow off cock is provided. The heating surface is 45 square feet and the over all dimensions of the generator are: Length, 22 inches; width, 12 inches, and height, 18 inches. A Jenkins kerosene burner has been used on this vehicle from the start, and has given its designer good satisfaction. The fire is controlled from the driver's seat. Twenty-five to 40 pounds



STEAM DELIVERY WAGON OF THE SPENCER AUTO-VEHICLE COMPANY.

of air pressure in the fuel tank suffice to volatilize the oil and secure complete combustion. The boiler is located at the extreme rear of the vehicle behind the rear axle. Two flues on the inside of the body carry off the furnace gases. The exhaust steam from the engine is conducted into them and escapes with the products of combustion. No exhaust is visible, even in cold weather, it is said.

When the fuel tank has just been filled it is necessary to pump air into it to start up the burner. A hand pump, which is bolted to the footboard, is provided for this purpose. A Marsh steam pump is fitted to the wagon as an auxiliary boiler feeder.

The automatic feed water regulator comprises a stand pipe (with try cocks), which is secured to the boiler. An aluminum float in the pipe controls the feed, as follows: As soon as the water in the boiler rises, the float rises with it. When the high level is reached, the tube which pierces the float closes up the opening through which the water enters the boiler, a bypass is automatically opened, and the boiler feed pump discharges into the water tank. When the water level falls, the float sinks, the bypass is closed and water is again fed to the generator. Mr. Spencer relies altogether on the automatic regulator. He states that the water has, repeatedly, been let out of the boiler while the fire was burning, that cold water was forced in as soon as the tubes became red hot, and that no injury was done.

The control devices comprise a side steering lever, a throttle and a reverse lever, which shifts the valve cams on the engine shaft. The latter are controlled by pins which work in helical grooves. A foot pedal applies a band brake on the drum of the differential. The tire brakes are applied by the same pedal in case the other brake gives out.

The body springs are full elliptics, 36 inches long, 1½ inches wide, and have five leaves. The frame is built up out of angle steel, 3-16x1½x2½ inches. Cross pieces are of the same shape. There are no tanks or machinery in the body, which has the following dimensions for useful load: Length, 4 feet 4 inches; width, 3 feet 10 inches; height, 4 feet 8 inches. The wagon weighs 2,100 pounds, including supplies, and can carry 1,200 pounds of merchandise. Its water tank (sheet copper) holds 40 gallons, and the fuel tank 10 gallons. The latter is a steel shell, and has one head rivetted to it. The fuel consumption is said to be 1 gallon per 5 miles with a full load, and 1½ gallons of water are evaporated per mile. The speed of the wagon is 10 to 15 miles per hour, according to the condition of the roads. In the future the wheel base is to be lengthened to 7 feet. The designer built a runabout before this wagon was built. The latter has covered over 3,200 miles, including runs from Hartford to New York.

The Spencer Auto-Vehicle Company was incorporated recently to exploit the patents of C. M. Spencer, a pioneer automobile designer, and the inventor of the system described above.

The New Carriage of Stanley Brothers.

By Albert L. Clough.

Stanley Brothers, of Newton, Mass., have brought out a new chainless type of their well known steam carriage, which embodies several points of interest.

A distinct departure from ordinary steam carriage practice is apparent in the engine and transmission. Contrary to universal custom the engine is horizontal, the head being supported by a metal strap from the body and the crank end being concentrically supported upon the live rear axle. The engine is of the double cylinder type with ball main bearings and crossheads and has been described in these columns. The driving sprocket heretofore used has been replaced by a steel spur gear and the engine frame extended for accurate attachment to the tubular rear axle. The steel engine pinion meshes directly with a phosphor bronze gear on the differential casing. It is claimed that the combination of the steel pinion and phosphor bronze gear secures the minimum of noise and wear. A burnished copper case, capable of easy removal, completely surrounds the engine, transmission and differential, and it is said to be found in practice that sufficient cylinder oil passes by the pistons and into the case to supply lubrication to all the moving parts contained therein for considerable periods. The Stanley boiler, which effects a high degree of superheat without recourse to intensely heated metallic surfaces, has been described in a previous number of The Horseless Age. This boiler is used on the new vehicle, with the addition of two novel features. It has been found that the use of the traditional form of gauge glass was rendered almost prohibitive by the high pressures and degrees of superheat which it has been found economical to adopt. At the extremely high temperatures at which the glasses were necessarily maintained, a single drop of cold water accidentally splashed upon them was almost sure to cause a breakage. The water glass has thus been discarded and an automatic indicating float has been adopted which instantly shows by the position of a small index on the right hand side of the operator whether the water level is low, normal or high. This index can be read by the sense of touch, thus rendering a gauge lamp or mirror superfluous.

In order to provide against the burning of the boiler through carelessness in the maintenance of the water level, a fusible plug device of a novel character has been adopted. One end of a small pipe is tapped into the boiler at a point near the bottom of the water space and the other end communicates with the water space at a point a few inches higher. There is a small tee in this pipe which is closed with a plug of fusible metal. In the normal operation of the boiler there is a constant circulation of water through this pipe from its lower to its higher extremity, but if the water level falls below its upper termination the circulation ceases, the water evaporates from the pipe and the fusible plug, previously kept relatively cool by the water circulation, immediately melts and warns the operator. The plug is accessible and easily replaced. On the right of the operator, within easy reach, are the valves controlling the main burner, pilot light and pump bypass. The throttle is of the conventional form, but the reverse is by means of a pedal. The brake, operated by a pedal, acts upon an extension of the differential casing. The weight of the vehicle, light, is stated to be about 600 pounds and when fully supplied about 800. Cylinder lubrication is by means of a mechanically forced feed lubricator operated by a step by step ratchet and pawl mechanism.

The makers state that they can cover as high as 18 miles per gallon of gasoline under fair conditions and can travel 2 miles on each gallon of water, and also that the complete inclosing of all moving parts conduces to a very long life for the whole mechanism.

The Puritan Steam Carriage.

The "Puritan" steam carriage recently brought out by the Locke Regulator Company, of Salem, Mass., embodies a number of interesting points.

The new vehicle is a four passenger rig, with top designed to carry two upon the box seat in front. The wheel base is 6 feet and the wheels 30 inches in diameter, of the artillery type, with aluminum hubs, and run on roller bearings. Both axles are strongly undertrussed. The under frame is composed of two tubular reaches uniting the axles and the springs are double elliptic. A metallic body is employed, of very elegant design and finish. Steering is by means of inclined wheel and pinion and sector gear, and the steering head is jointed in the middle so that it may be pushed out of the way when entering or leaving the carriage.

The engine is of the well known Locke type and requires no description, and the boiler is of the tubular superheating type, with coils for this purpose in the fire and in the intake. The normal working pressure is 350 pounds and it is stated that the boiler cannot be burned out by any ordinary mishandling. The burner is of steel and of improved construction and the gasoline is pumped direct to the burner by a crosshead pump, so that no storage of the fuel under air pressure is necessary. The gasoline tank, which is forward, will hold 16 gallons, which is said to suffice for a run of 100 miles. Thirty-two gallons of water are carried in

the tank, which surrounds the boiler in the rear. In addition to the usual cross-head feed pump controlled by a bypass, there is an auxiliary Victor steam pump, the throttle of which is easily reached from the seat. For filling the water tank a Locke ejector is used and sufficient rubber hose is carried to permit taking water from a bridge out of a stream 10 or 12 feet below. The water tank is conveniently supplied with a gauge glass.

The control of the engine is decidedly novel, the throttle taking the form of a foot button exactly like the throttle pedal of a gasoline carriage. This button may be placed in the pocket when leaving the carriage. The reverse is also effected by a pedal, and an auxiliary hand throttle is located under the seat apron. In starting the main burner, the Howard atomizing system is employed, doing away with the use of the torch or generator. By means of a small hand air pump gasoline is atomized from a little tank and is so mixed with air as to give perfect combustion. If a lighted match has been placed in the burner, this vapor immediately ignites and after a short time the main gasoline supply may be opened, when the main burner immediately starts into action.

Oiling is by means of sight feed lubricators placed upon the dash, one of which supplies the cylinders and two others the crossheads.

The carriage has aluminum mud guards of the French pattern and is handsome in appearance. Its weight is about 1,000 pounds and it is said to be able to make 20 miles per hour under average conditions. The rated horse power of the engine is 6.

Knickerbocker Racer.

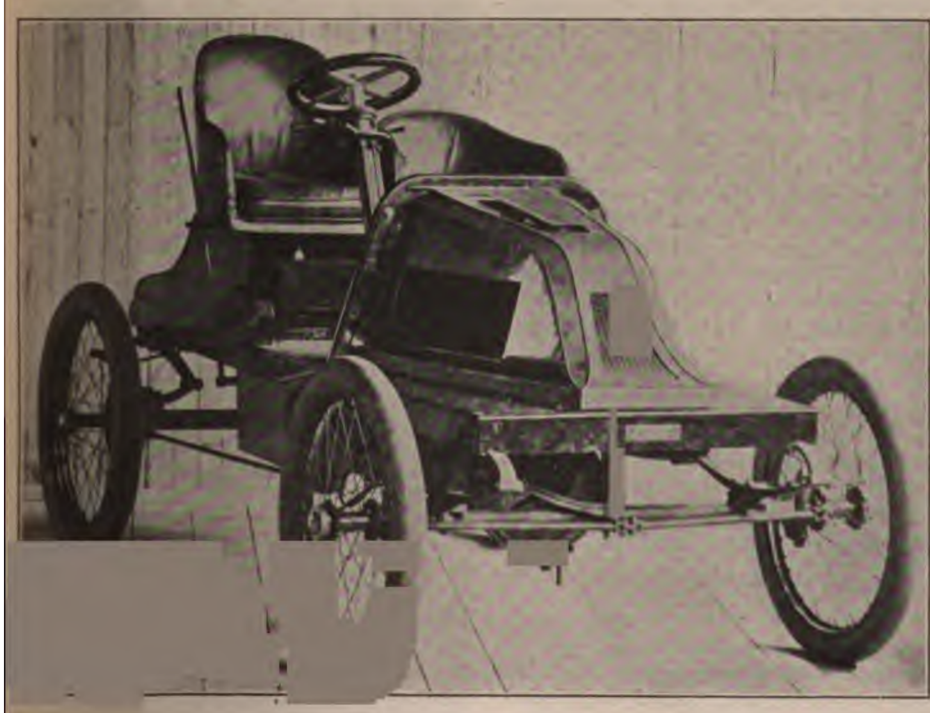
The illustration herewith shows an 8 horse power racing vehicle built by the Ward Leonard Electric Company, of Bronxville, N. Y. It weighs 970 pounds, has three speeds and reverse and direct drive on the high speed. The maximum speed is claimed to be 42 miles per hour.

American Machine Manufacturing Company's Spark Plug.

A new mica insulated spark plug has just been placed upon the market by the American Machine Manufacturing Company, 46 West Second street, South Boston.

The metallic shell of this spark plug has a tapered bore and the central electrode

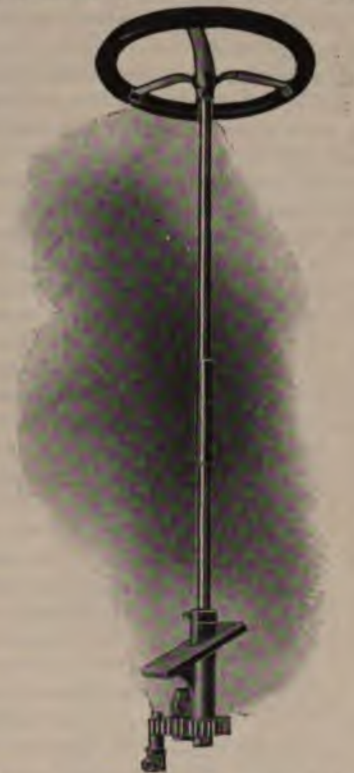
is made with a corresponding taper. This central electrode is surrounded by a mica bushing. The bushing projects a considerable distance from the metallic sleeve at the inner end of the plug, as well as at the outer end, where mica disks are slid over the bushing and clamped between the outer metallic sleeve and a nut on the outer threaded end of the central electrode.



8 Horse Power Knickerbocker Racer.

Dyke's Wheel Steering Device.

We illustrate herewith a wheel steering device placed upon the market by A. L. Dyke, of St. Louis. The device is provided with either a 13 inch or 15 inch wood



wheel, and can be fitted to any machine, it is said. Gear wheels at the lower end of the device reduce the motion, but apparently are not of the locking variety.

A Tourist's Lunch Basket.

Charles E. Miller, 97 Reade street, New York, is placing on the market the "refrigerator" basket herewith illustrated. It is lined with aluminum and has a trough for ice at one end, which is made of the same metal. A felt lagging which sur-

rounds the metal lining prevents the ice from melting rapidly. The cover is hinged in the middle, but may be easily removed. A gasket of felt makes a tight joint between the lid and the basket proper. It is recommended to touring automobilists.

Legislative and Legal.

An automobile ordinance has been introduced in the New Orleans City Council. Port Huron, Mich., Denver and Battle Creek are also about to adopt speed reducing legislation. At a recent meeting of the Camden, N. J., freeholders a committee from the Atlantic County board of freeholders sought the co-operation of the Camden board in an effort to suppress the automobile nuisance in the two counties. A bill making 12 miles the maximum has been prepared. The matter was finally referred to the solicitors and the stone road committees of both counties.

Three auto scorchers were arrested last week at Manchester by the Sea, N. H., among them being George C. Cannon, the Harvard student, whose steam racer has brought him notoriety. Stop watches and a measured road did the business.

N. E. Brown was arrested at Minneapolis, Minn., recently for violating the speed ordinance while running a French machine owned by Thomas Shevlin, of that city.

Several automobilists, including two prominent men, were arrested at Buffalo last week for excessive speeding.

In answer to a communication from the board of commissioners of Columbus, Ohio, E. L. Tatlor, prosecutor of the county, has rendered an opinion to the effect that the statutes give county commissioners no power to fix the maximum speed at which automobiles may be driven over the roads of the county. They cannot in any way regulate the speed.

At the last meeting of the Colorado Automobile Club, Denver, Col., a decided stand was taken against scorching on the public highways. The old officers were re-elected and new standing committees appointed for the year.

Prominent citizens of Merion and Paoli townships, near Philadelphia, have filed sworn statements against twenty-one prominent Philadelphians, who are threatened with arrest unless the speed of their automobiles is moderated.

The new Philadelphia automobile bill, which it was hoped would become a law immediately, has been tabled until fall at least by the adjournment of the councils. The old law limiting speed in the downtown districts to 7 miles an hour is still in force.

Sylvester G. Averell, of New York city, who was arrested at Freeport, L. I., recently for illegal speeding of his automobile, and who pleaded not guilty, withdrew his plea, and was fined $25.

The Philadelphia *Press* is authority for a very dramatic story about John M. Chestnut, a retired merchant living at Wayne, a suburb of Philadelphia. According to the above, Mr. Chestnut, while out driving the other day, encountered an automobilist who refused to stop his machine on signal, though Mr. Chestnut's horse was making trouble. Mr. Chestnut then whipped out a revolver and commanded the autoists to stop on pain of instant death, whereupon the automobile came to a standstill, and the horse was coaxed by without further damage.

Harry W. Dupuy, of Allegheny, Pa., the Yale senior by whose automobile D. Thorpe Munro received fatal injuries on June 10, has been held under $1,000 bonds.

Patrick Kenny died at the Smith Infirmary July 13, the third victim of the Automobile Club's Staten Island races of May 31.

Automobilists of Oakland, Cal., refused to participate in a Fourth of July parade organized by the Merchants' Exchange because of the speed limit recently imposed upon them.

On the evening of July 11 a dinner was given at Oyster Bay, L. I., for the purpose of organizing an association to restrain the chauffeurs who have been monopolizing the roads of this section of Long Island. Senator W. W. Cocks presided.

A. A. McKelvey, of Bridgeport, Conn., was arrested near Saugatuck recently and fined $11.11 for reckless speeding of his automobile.

Many arrests were made in Nassau County last Sunday for violating the automobile speed law.

The feeling of the wealthy cottagers of Lenox, Mass., against automobiles has culminated in the issue of a circular in which reference is made to the general feeling of insecurity prevailing among the cottagers in consequence of the recklessness of automobilists. It further says: "Under the circumstances the club declares that for all violations of the existing Massachusetts statutes there should be the most vigorous prosecution, and that for violation of the statutes in Lenox from this time until October 30 the club will pay a reward of $25 to each person securing a conviction."

A Distressing Accident.

Harry E. Hayes, Cleveland, Ohio, a prominent banker and member of the Cleveland Automobile Club, was very seriously injured at about midnight, July 11, while driving his automobile rapidly out Euclid avenue to his home. A pile of paving material had been left in the street without a warning light, and Mr. Hayes ran into the obstruction with such force as to throw him forward under the wreck of his machine, which then caught fire. When rescued he was unconscious, and a fatal result of his injuries is feared.

American "Electro-Gasoline" Buses for London Streets.

A London cable states that the London Road Car Company, the second largest of the companies operating omnibuses in the great metropolis, has ordered ten Fischer "electro gasoline" omnibuses at £500 each. The new buses are to be delivered in three months. They will have a speed of 12 miles an hour, a capacity of thirty passengers, as against twenty-six passengers carried by the horse buses, and will be expected to travel 100 miles a day, as against 56 by the horse buses.

Mica Masks.

Mica masks are gaining in favor among German automobilists. They protect the eyes, nose and mouth against strong wind and the dust of the road without offering any obstacles to normal respiration and vision. The mask is not fragile, not subject to weather influences and weighs only 25 grams, the same as an ordinary pair of glasses. It can be folded up and carried in the pocket.

Reorganization of the Cunningham Engineering Company.

The Cunningham Engineering Company, of Boston, which a year or two ago undertook the development of a steam truck invented by Patrick Cunningham, of New Bedford, Mass., and was afterward succeeded by the Massachusetts Steam Wagon Company, with a capital of $200,000, has again come to light in the Engineering Company of America, recently incorporated in New Jersey with a capital stock of $5,000,000, $2,000,000 of which is 6 per cent. non-cumulative preferred, and $3,000,000 common.

The officers and directors of the company are as follows: President, Alvah Trowbridge, of New York; vice president, Charles P. Smith, of Fitchburg; secretary and treasurer, Fred D. Stanley; directors, James D. Livingston, New York; Marshall D. Barr, New York; D. C. Fiske, Worcester; Henry A. Belcher, Boston; H. L. Herbert, New York, and Charles B. Duffy, Worcester.

A device for protecting bearings from heating has been patented some time ago. An ordinary oil cup is placed on the bearing to be protected, and has communication therewith through the usual opening. This opening is, however, closed at its lower end by means of a fusible plug that will be melted at a low temperature. Should the shaft or bearing become heated to a sufficient degree, owing to the neglect of the attendant from any other cause, the plug will be fused or liquefied by the heat, thereby releasing the oil.

The Anderson Pole and Shaft Company, Anderson, Ind., are placing on the market a lifting jack, called the "Winner," said to be capable of lifting 800 to 1,500 pounds, though weighing 5 pounds or less. It is made in two sizes.

Motor Bicycle Experience.

Motor bicycles are at present nowhere more popular than in England, and the following experience with such machines related in the *Motor Car Journal* by one of the earlier riders should prove of interest to some of our readers:

"My experience of motor bicycles, which extends over about a year and a half, is practically confined to two makes, (1) being a machine supplied to me by Messrs. Luthi & Zurcher, of Neuchatel, who were the original inventors of the type of machine that now goes by the name of 'Minerva,' 'Excelsior,' etc.; (2) a Werner motor bicycle, of the form with the engine placed in front of the handle bar.

"The chief defects that I have found with the Luthi & Zurcher machine are as follows: The power, which is stated to be 1 horse power, is insufficient to climb even ordinary hills without assistance by the pedals. When in good order, however, the bicycle will go about 20 miles an hour on the level, and the amount of assistance necessary to enable it to climb hills is not very great. The exhaust and inlet valves are both too small, particularly the former, which consequently is very apt to get burned, and requires constant grinding in; the inlet valve also is liable to get overheated, which makes it stick. There is a great deal of leakage oil, which comes out at the engine bearings; this gets on to the belt, and makes the latter slip, while it also gets on to the trembler, and prevents it from making a proper contact. This leakage is, I think, due to the bearings being made too narrow, in order to get the engine to fit in between the cranks of ordinary "spread." Owing to oil on the belt, the latter has to be made very tight to prevent slipping, with the result that the fastenings tear out. The position of the engine in front of the bottom bracket leads to its getting very dirty, while if a wide mud guard is used on the front wheel, to avoid the dirt being thrown up on to the engine, the latter is apt to get overheated, owing to the mud guard preventing the wind from blowing onto it. The compression tap is of a form that is very apt to stick, and also to leak. The handles for controlling the apparatus are not very conveniently placed. They are much better arranged on the handle bar, as is the case of the Werner machine. The form of surface carburetor employed is very liable to be affected by jolts. The fine wire gauze on the air admission tap is apt to get blocked up with the dust, with the result that sufficient air does not pass. I believe that most of these defects have been remedied in later machines.

"The engine of the Werner machine, which is supposed to be of 1½ horse power, will take the bicycle up any ordinary hill without assistance, and one can travel about 30 miles an hour on the level. The position of the engine in front of the handle bar keeps it clean, and conduces to it being kept cool, as it encounters the full force of the wind. I have had no trouble with the valves or trembler of this machine, all of which are on a considerably larger scale than those of the one above referred to; nor is there any trouble in the Werner with oil leakage. I, however, find that the belts are very apt to stretch when new, and to crack when they have done stretching. Putting a little vegetable oil upon them seems to help to stop the cracking. The handles for controlling the mechanism on the Werner are, on the whole, very conveniently situated, though the one that controls the supply of air is somewhat clumsy, and one cannot leave go of it for an instant, as it moves its position with the vibration. My machine was originally fitted with a surface carburetor, which has the defect of being easily affected by jolts; but I have recently substituted a spray carburetor, which appears to be fairly free from this defect. I think it is a mistake that the induction coil is exposed to the weather, and not inclosed in the same box as the battery. The front tire, though originally corrugated, has worn entirely smooth; this appears to be due to the weight of the engine on the front wheel, and to the tire slipping on the road under the impulses of the engine, and when it meets an uneven surface. The back tire shows no wear of this description. The fact that the engine is attached to the handle bar does not appear materially to add to the vibration of the latter, but the machine is somewhat stiff to steer, and great care is required in turning sharp corners.

"Both the types of motor bicycles mentioned above are undoubtedly liable to sideslip, but I have not noticed that there is anything very much to choose between them in this respect, although in the one case the engine is high up and in the other case it is low down. In the Luthi & Zurcher machine it is the back wheel, and in the Werner the front wheel that usually slips first. That is to say, it is always the driving wheel that is apt to slip. As long as the roads are dry they are very easy to manage and to control, but however careful and experienced the rider may be, I do not think they are really safe to ride in traffic on wood, or especially on asphalt which is in a greasy condition. Both machines, as originally supplied, were, I think, defective in not having sufficient capacity for gasoline, this only amounting to about 50 miles, whereas to my ideas the capacity should certainly not be less than 100 miles. In the case of the Luthi & Zurcher machine I have added an additional tank, so arranged that by blowing air into this tank with the bicycle pump the gasoline can be made to flow into the working tank. In this way I have increased the capacity to 120 miles, but I do not see why the original tank should not have been larger, and, of course, two small tanks must weigh more for the same capacity than one large one.

"I think the weight of motor bicycles is a matter of great importance. Each of the machines mentioned above weighs between 70 and 80 pounds, and this is a weight which one can, unassisted, carry upstairs, lift over obstacles, or place in railway trains, etc. With any considerably greater weight, however, one could not do these things, and this is, in my opinion, a considerable bar to the utility of the Singer bicycle, which, I believe, weighs about 120 pounds, or of the Holden bicycle, which, I understand, weighs 160 pounds. Indeed, the chief advantage of the motor bicycle over the motor tricycle and small automobiles is done away with if the weight exceeds what one man can lift. In the case of the Werner the engine is very noisy. I think this could be improved by having a larger muffler. Under certain circumstances explosions in the muffler are also very apt to occur, which is a troublesome feature.

"I believe many persons have a difficulty with the ignition, and personally I had considerable trouble in this respect with the Luthi & Zurcher machine, so long as I used dry batteries. As soon, however, as I substituted for these a two cell storage battery of reasonable size my difficulties disappeared. No doubt, in many cases, loose electrical connections, bad contacts, short circuits and allowing the storage battery to run down, may give trouble, particularly to those who are not used to electrical apparatus. The platinum contact pieces on the trembler as usually supplied are very small and thin, and quickly wear out. In my case I have put on contact pieces nearly one-eighth of an inch thick, and since then have had no trouble with them. It must be borne in mind that with engines as small as those used on motor bicycles the matter of getting a good compression is of great importance, while at the same time comparatively small air leaks, which would not materially affect a larger engine, have great influence in making the compression bad. It is therefore of special importance to see that all joints are made tight, and that the valves are properly ground in; this specially affects the power of the engine to take the bicycle uphill, as it is at low speeds that air leakages have most effect in reducing the compression.

"Generally I may say that, in my opinion, the motor bicycle has come to stay, and that it will be found to afford much amusement and to be of considerable utility to many who cannot afford to pay the price of an automobile, or to find space for housing anything more bulky than a bicycle.

"To others, again, the possession of a motor bicycle will be the prelude to obtaining an automobile, and to these the experience of internal combustion engines economically attained with the former will be found of great value when the more costly article comes to be worked. In fact, the motor bicycle, while remaining the poor man's motor carriage, will also serve as a means of education to the rich."

Kerosene Number, May 28. Price, 10 cents.

MINOR MENTION

Automobilists of Waterbury, Conn., are agitating for a club.

J. H. Fisher has opened an auto station on East Ferry street, Easton, Pa.

The organization of the Greeley Automobile Company at Greeley, Col., is reported.

The Olds Motor Works, Lansing, Mich., is now said to be turning out seventy-five Oldsmobiles a week.

Edward Cowan has purchased the automobile station of James A. Turnbull, Jr., at 36 Dwight street, Springfield, Mass.

Rogers & Co. are reported about to establish an automobile factory at Knoxville, Tenn., in the plant of the Biddle Manufacturing Company.

W. P. Willing and Chris Hafner have purchased the old Prairie Club House in Oak Park, Ill., and will, it is reported, turn it into an automobile depot.

The Automobile Club, of Springfield (Mass.), has reduced its dues from $25 to $12 a year, and chosen J. C. Cowan's automobile station as its headquarters.

Chas. J. Glidden, a member of the Massachusetts Automobile Club, sailed for Europe recently, with the intention of making a 2,000 mile automobile trip through France, Germany, Austria and Switzerland.

Dr. C. S. Holden, of Attleboro, Mass.; Frank Talbot, of Morton, and Dr. Arthur R. Crandall, of Taunton, have been appointed a committee to arrange for an automobile demonstration and races at the coming Taunton Fair, September 22.

The following officers have been chosen by the stockholders of the Spencer Autovehicle Company, recently incorporated with $500,000 capital, to manufacture a steam delivery wagon invented by C. M. Spencer, of Hartford: C. M. Spencer, president; W. F. Rogers, of New York, vice president and general manager, and P. W. Bensel, secretary and treasurer.

An automobile club has been formed at San José, Cal., with an initial membership of twenty-eight. There are thirty-two private owners of automobiles in the city, and the club expects to increase its membership to thirty-five or forty very soon. The following officers have been elected: E. T. Sterling, president; Frank Coykendall, vice president; B. D. Merchant, secretary, and W. F. Hunt, treasurer.

The Wachusett Automobile Club, of Fitchburg (Mass.), has recently organized. Membership comprises the automobilists of Fitchburg and the surrounding towns The following officers were elected: President, F. C. Putnam, Fitchburg; vice president, Dr. A. H. Pierce, of Leominster; secretary, L. H. Greenwood, of Gardner; treasurer, George P. Grant, Jr., of Fitchburg. The directors are the officers and Dr. A. E. Mossman, of Westminster; Dr. J. G. Henry, of Winchendon, and Henry R. Smith, of Leominster.

J. B. Manley and R. H. Sargent, Brattleboro, Vt., have taken the Toledo agency.

T. S. Morse, Lenox, Mass., has opened an automobile storage depot.

Frank P. McEvoy, bicycle dealer, of East Main street, Waterbury, Conn., will establish an auto station.

City Electrician Ellicott, of Chicago, states that no one armed automobilist need apply for a license at his bureau.

By a fire on a steam automobile several children were burned, one probably fatally, at Roger Williams Park, Providence, R. I., on Sunday.

The Automobile Club of Trenton has been organized by Karl G. Roebling, president; John S. Broughton, vice president; Edward S. Wood, secretary; George Buckman, treasurer, and others.

The Tropp Manufacturing Company, 213 and 215 Grand street, New York, have equipped their shop with high grade machine tools, especially adapted to experimental work and the production of high grade electrical instruments.

The Waltham Manufacturing Company are at present devoting themselves principally to motor bicycles and are turning them out in 100 lots. They are also putting through twenty-five runabouts. All motors are made in this country.

The United States Long Distance Automobile Company is putting in new machinery at its shops in Jersey City, and hopes to produce at the rate of twenty machines a week in the near future. A dividend of 7 per cent. was recently declared on the preferred stock.

Among recent New York incorporations is the Smith Storage Battery Company, of Binghamton. Capital, $100,000. The directors are T. J. Coster, M. O. Smith and O. C. Rohe. The battery they intend to manufacture was described in our patent columns last week.

George Donelly has purchased the three seated gasoline machine entered by R. W. Coffee & Sons, Richmond, Va., in the A. C. A. 100 mile non-stop contest. The vehicle now carries passengers from the Pelham avenue station of the Elevated Railroad to Bronx Park, New York city.

The Standard Automobile Company, agents for the Elmore, have installed a well equipped machine shop at 136 West Thirty-eighth street, New York city, and will do repair work on automobiles. Parts and supplies for the leading makes of machines will be carried. The building has been enlarged and arranged for the automobile business.

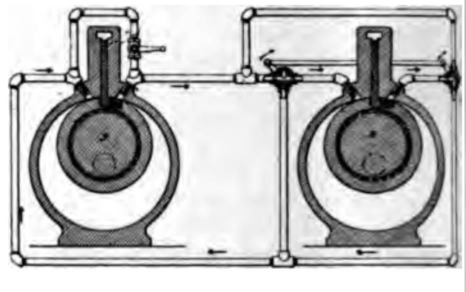
The Wabash Transportation Company has been incorporated in Indiana to run an auto stage line to and from Terre Haute. The capital is $12,000, and the incorporators are W. D. van Horn, P. K. Reinbold, Edward E. Evinger, Grant G. Tubbs, Terre Haute capitalists, and Richard Potter, of Clinton; Barnabas Navin, of Brazil, and James Henan, of Linton.

MOTOR VEHICLE PATENTS..

United States Patents.

704,430. Speed Regulating and Reversing Device.—Frank H. Bates, of Philadelphia. July 8, 1902. Filed January 19, 1901.

The invention provides a system of power transmission for gasoline engines or other



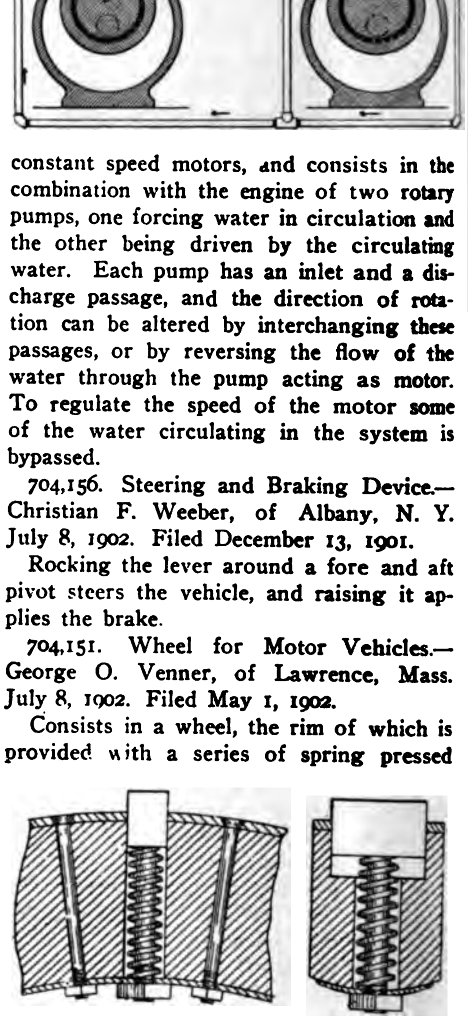
constant speed motors, and consists in the combination with the engine of two rotary pumps, one forcing water in circulation and the other being driven by the circulating water. Each pump has an inlet and a discharge passage, and the direction of rotation can be altered by interchanging these passages, or by reversing the flow of the water through the pump acting as motor. To regulate the speed of the motor some of the water circulating in the system is bypassed.

704,156. Steering and Braking Device.—Christian F. Weeber, of Albany, N. Y. July 8, 1902. Filed December 13, 1901.

Rocking the lever around a fore and aft pivot steers the vehicle, and raising it applies the brake.

704,151. Wheel for Motor Vehicles.—George O. Venner, of Lawrence, Mass. July 8, 1902. Filed May 1, 1902.

Consists in a wheel, the rim of which is provided with a series of spring pressed

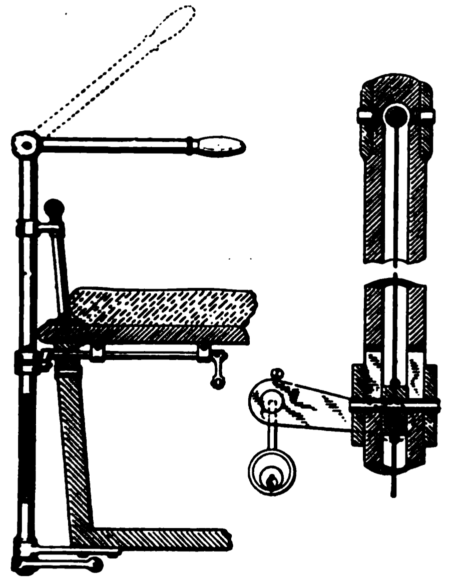


teeth which normally project beyond the bearing surface of the tire of the wheel, and each of which is adapted to be forced into the rim against the action of a spring as the weight of the vehicle is brought to bear on its projecting end.

In practice the projecting ends of the teeth will successively engage the ground and will hold the wheel from slipping when power is applied thereto. As each tooth approaches the vertical line through the centre of the wheel the weight of the vehicle will gradually be brought to bear thereon and it will be forced inwardly until its outer end is nearly flush with the

surface of the tire. The tension or strength of the spring of each tooth is preferably such that when a tooth passes the vertical centre line the weight of the vehicle will not force it in flush with the surface of the tire, so that by suitably arranging the teeth the vehicle will at all times be supported by the springs, and its weight will at no time be actually borne by the tire. These spring pressed teeth, therefore, not only prevent the slipping of the wheel when power is applied to it, but also provide a spring cushion or yielding support for the vehicle at all times.

704,102. Steering and Controlling Device for Road Vehicles.—Major D. Porter, of New York, N. Y. July 8, 1902. Filed February 11, 1902.

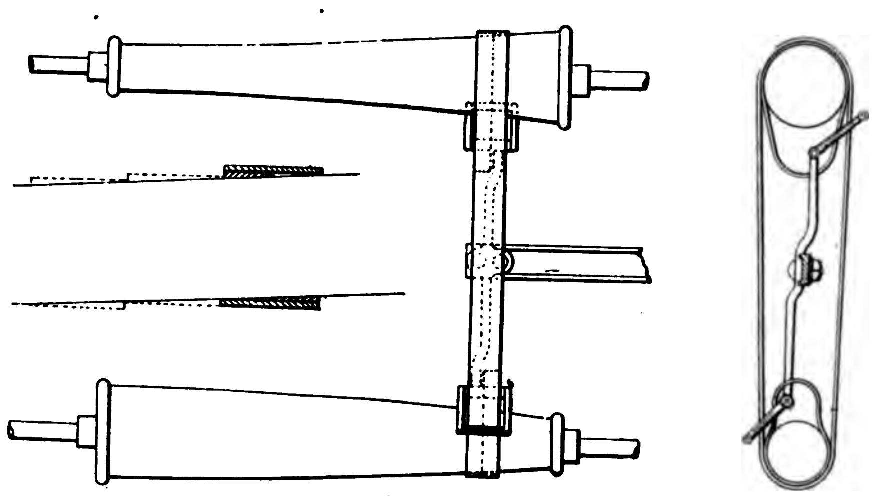


Refers to a combined steering and throttle lever for a steam carriage. The steering gear shown in the drawings is of the side lever variety, comprising a hollow or tubular vertical steering post to which the steering lever is pivoted at the upper end. At the middle part of its length the steering post is slotted on opposite sides and a pin extends through these slots. The pin is suitably connected with the end of the steering lever, so that when the steering lever is moved up and down the pin moves correspondingly in the slot. The parts of the pin extending outside the post support a sleeve over the post, and from this sleeve connection is made to the throttle valve.

704,022. Steam and Oil Separator.—Eduard Friesdorf, of Bietigheim, Germany. July 8, 1902. Filed November 18, 1901.

704,203. Pulley and Band Power Transmitting Appliance.—Joseph Moorhouse, of Ashton-under-Lyne, England. July 8, 1902. Filed March 1, 1901.

This invention relates to pulley and band or like power transmitting appliances, and has for its object, first, to improve the driving efficiency of the band; secondly, in the case of cone driving to render the speeds of the two opposite edges of the band equal or approximately equal, and thirdly, to permit of the use of a metallic in lieu of a leather or woven band.



No. 704,203.

The inventor claims the combination of two pulleys, one at least of which is conical, a driving belt passing around said pulleys, a loose packing strap intermediate the belt and conical pulley, and means embracing said belt and strap to hold them in operative position. The means to hold belt and strap in operative position consists in guiders, which are a close fit and encircle both belt and straps, and with the straps of greater circumference than the wider ends of the cones they readily move from end to end of the cones along with the belt. A driving belt thus provided with an intermediate strap will last considerably longer than a belt without it, and instead of being heated by the excessive friction that an ordinary belt has to undergo it is kept comparatively cool. With both edges of the belt in effective operation the belt is also more effective during action, and in starting and stopping the frame it has great certainty of action.

704,209. Vehicle Body.—Chas. F. Putnam, of Fitchburg, Mass. July 8, 1902. Filed March 8, 1902.

Both ends of the body are dropped below the horizontal plane of the base line of the body, and these dropped portions have horizontal bases and upwardly and inwardly inclined end walls. To the lower ends of each of these inclined ends is hinged a footboard, having suitable braces to strengthen and support the gates in their open position.

The object in dropping both ends of the body below the horizontal base line of the body proper is not only to give the chauffeur an unobstructed view, but it provides for lowering the footboard or gate near enough to the ground to allow the occupant to enter and leave the seat without the employment of an extra step.

In the form of vehicle body shown the side rails of the body are cut out at the sides to allow the chauffeur to enter and leave the middle seat with ease, and the seat in front of the middle seat is by reason of the dropping of the front under portion of the body below the base line proper of the body disposed sufficiently lower than the middle seat as to allow the chauffeur to see over the heads of the occupants of the front seat and to have an unobstructed view ahead. The rear seat may be also in a lower plane than the middle seat, and each seat may be associated with a hinge, which may be folded down upon the seat in the usual well known manner.

704,034. Carburetor.—William S. Head and George J. Dovey, Latrobe, Pa. July 8, 1902. Filed April 9, 1902.

704,060. Internal Combustion Engine.—Frank Lister, Keighley, England. July 8, 1902. Filed July 27, 1901.

704,125. Battery.—William T. Seddon, Minersville, Pa. July 8, 1902. Filed July 20, 1901.

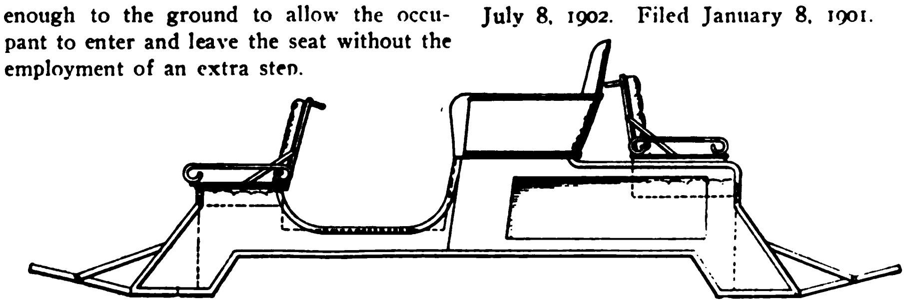
704,252. Process of Making Plates for Storage Batteries and Product Thereof.—Henry K. Hess, Philadelphia, Pa. July 8, 1902. Filed July 30, 1901.

704,253. Steam Propelled Vehicle.—Henry K. Hess, Philadelphia, Pa. July 8, 1902. Filed November 15, 1901.

704,254. Steam Propelled Vehicle.—Henry K. Hess, Philadelphia, Pa. July 8, 1902. Filed January 14, 1902.

704,296. Automobile.—Jackson D. Carrington, New Castle, Pa. July 8, 1902. Filed January 24, 1902.

704,303. Reversible Galvanic Battery.—Thomas A. Edison, Llewellyn Park, N. J. July 8, 1902. Filed January 8, 1901.



No. 704,209.

704,304. Reversible Galvanic Battery.—Thomas A. Edison, Llewellyn Park, N. J. July 8, 1902. Filed March 1, 1901.

704,305. Electrode for Batteries.—Thomas A. Edison, Llewellyn Park, N. J. July 8, 1902. Filed May 17, 1901.

704,306. Reversible Galvanic Battery.—Thomas A. Edison, Llewellyn Park, N. J. July 8, 1902. Filed June 20, 1901.

704,342. Feed Water Burner, or Like Regulator.—John Johnston, London, England. July 8, 1902. Filed February 26, 1902.

703,649. Self Propelled Vehicle.—Edwin R. Gill, of Englewood, N. J. July 1, 1902. Filed November 11, 1899.

A slow speed electric motor is directly connected to the steering wheel of an automobile.

703,405. Roller Bearing.—William G. Griffin, Washington, D. C. July 1, 1902. Filed October 5, 1901.

703,408. Rubber Tire.—William R. Harris, Akron, Ohio. July 1, 1902. Filed December 30, 1901.

703,420. Process of Making Electric Accumulator Plates.—Rudolph M. Hunter, Philadelphia, Pa. July 1, 1902. Filed August 1, 1899.

703,435. Ball Bearing Journal Box.—Frank E. Manahan, East St. Louis, Ill. July 1, 1902. Filed September 21, 1901.

703,459. Automobile Attachment for Vehicles.—John F. Peterman, Indianapolis, Ind. July 1, 1902. Filed September 3, 1901.

703,511. Oil Vapor Engine.—George Wood, Newark, N. J. July 1, 1902. Filed February 16, 1901.

703,553. Brake.—Walter A. Crowdus, Chicago, Ill. July 1, 1902. Filed September 16, 1901.

703,591. Hydrocarbon Vapor Burner.—John Johnston, London, England. July 1, 1902. Filed February 18, 1902.

703,629. Variable Speed Gearing.—Louis T. Weiss, Flatbush, N. Y. July 1, 1902. Filed April 6, 1901.

703,844. Running Gear for Motor Vehicles.—Francis J. Stallings, Effingham, Ill. July 1, 1902. Filed August 31, 1901.

703,860. Expansible Pulley for Motor Vehicles.—Paul ——, Paris, France.

703,895. Separator Plate for Secondary Batteries.—Absalom F. Clark, Philadelphia, Pa. July 1, 1902. Filed October 18, 1900.

703,937. Vaporizer for Explosive Engines.—Joseph Lizotte, Quincy, Mass. July 1, 1902. Filed November 21, 1901.

The Passe-Partout on the Way Again.

H. Percy Kennard, one of the passengers in the Passe-Partout, which is now on its tour round the world, sends us an instalment of the log of the journey. From this it appears that the departure from Paris was delayed owing to various matters, and having waited in the French capital to see the race for the Grand Prix, they set off again on June 15, leaving Paris by the Porte Vincennes, the weather and roads being bad. At Meaux the electric ignition was so faulty that they had to use the tubes, and at Montmirail the washers blew out of the tubes. A series of minor disasters followed, such as the bursting of the inner tubes, etc. The route then lay through Chalons, St. Menehould, Verdun, La Croix sur Meuse, Pont Musson, to Champé on the French frontier. On leaving Lorry, the frontier town, an incident occurred which narrowly escaped ending in the wreck of the Passe-Partout. A sleek, well fed cat—apparently a public cat—got under the wheels, and was killed, whereupon the crowd, mostly women, became infuriated, and showered sticks, stones, and other missiles upon the luckless Passe-Partout. It was only by forming a ring round the car and forcing the crowd aside that the vehicle could be got away, happily unharmed. The Argyll, which is accompanying the Passe-Partout, received a heavy blow on its panel, but was not seriously damaged.

The next town was Metz, where the plugs and commutator were cleaned and the ignition adjusted. The roads here were execrable. On Wednesday, June 18, the fourth day from Paris, they passed through Saarburg, Trier, and the Moselle Valley, where the scenery was magnificent. Near Sehl the car, by some unaccountable means, charged an iron fence, which had to be pulled down before the vehicle could be extricated. The ferry at Trier was crossed, and Coblentz was reached the same evening. On Thursday beautiful running was made to Cologne, where a good time was spent, and early next morning they started for Dusseldorf, and on arrival there the cyclometer registered 1,197 kilometres, 777 kilometres of which had been done since Paris.

As regards wear, both cars are said to be standing the journey well, the Argyll having gone magnificently, and the tires, notwithstanding the immense amount of work thrust upon them during the long delay in Paris, show no sign of wear. After a short stay at Dusseldorf the cars set out for Berlin, and on June 22 were at Bielefeld. The following is a summary of the running times and distances: Sunday to Monday evening, 15th and 16th, 8 h. 40 m., 228 kilometres; Tuesday, 17th, 9 h. 31 m., 188 kilometres; Wednesday, 18th, 10 h. 15 m., 185 kilometres; Thursday, 19th, 7 h. 10 m., 176 kilometres; total, 35 h. 36 m., 777 kilometres.—*The Autocar.*

Aluminum Bronze.

Aluminum bronze containing less than 5 per cent. of aluminum can be soldered by tin solder. If over 5 per cent., a good solder consists of 20 per cent. zinc and 15 per cent. cadmium. The surfaces are cleaned, a first and second layer of solder is laid on, the excess is removed with a brass scratch brush, and the pieces are then soldered as usual. Brazing is done with a solder containing 52 per cent. copper, 46 per cent. zinc and 2 per cent. tin. For large pieces direct soldering by fusion succeeds very well.

Pin Holes in Aluminum Castings.

Pin holes in aluminum castings are, says the *Aluminum World*, one of the most common difficulties with which the aluminum foundryman has to contend. It almost invariably happens to a more or less extent it copper is the hardening ingredient which is used with aluminum, and is caused by overheating the metal in the crucible. "Soaking" or allowing the metal to remain in the fire, even at a moderate temperature, will also do it. With the alloys in which zinc is used for the hardening ingredient the presence of pin holes is not so apt to occur, but unless the temperature of the melted metal is kept down as far as possible it is likewise liable to occur with such alloys. In short, the cause of these pin holes is the overheating of the metal.

Ovalization.

The Delahaye Company are among the few manufacturers remaining in France who construct horizontal gasoline motors. In their catalogue, referring to the objection sometimes raised that horizontal motors wear their cylinders oval, they quote a story of Voltaire, who drank a dozen cups of coffee a day and was warned that it was a poison. He answered, "Yes, it is a poison; but it is a slow poison." And he backed up his assertion by living to be eighty-four. Messrs. Delahaye observe that if ovalization is the poison of the horizontal motor there are many Voltaires among their engines.

The naphtha industry of Southern Russia continues to flourish. During the past six years the yield has been more than doubled. In 1894 the output was 4,787,000 tons, against 9,672,000 tons last year. Automobilism is largely responsible for these facts.

VOLUME VIII.

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Issue of November 7, 1900.

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Record Breaking "Tours."

One of the most grotesque phases of the automobile movement in America at the present time is the record breaking "tours" which are being so widely heralded by the daily newspapers. Young Quixotes whose supply of money far exceeds their supply of brains invest in high powered automobiles and immediately start out in them across the continent, like traveling showmen, accompanied by press agents who fill the columns of the papers with accounts of their sensational exploits.

And what at best are these exploits? A foolish dissipation, ending in broken rest, depleted purses, broken laws, broken automobiles and broken bones. A disappointment to the one who essays it, breeding disgust and hostility among the people, and bringing disaster upon the cause. Is the cost not heavy enough to bring even an automaniac to his senses?

And suppose the automobile record between Blufftown and Wind City is broken, what good end is served? With wearisome iteration it has been pointed out by hundreds of competent authorities that automobiles are not high speed, long distance machines except in the hands of fanatic millionaires. The cost, on the best roads that can be built and with the best machines that mechanical science can construct, is absolutely prohibitive. The railroad and the trolley must continue to draw the crowds, and the automobile, if it is to endure, must subordinate itself to them, serve as a feeder or tributary to them, and not undertake the impossible task of supplanting them. All this widely advertised record breaking, therefore, is in direct antagonism to the best interests of the industry, misdirecting manufacturers, deceiving the public as to the economic capabilities of the automobile, arousing the prejudices of the populace, and paving the way for inevitable reaction and reverses.

That automobile touring is a legitimate and enjoyable pastime is freely admitted. Long after the record breakers have gone into the oblivion they merit sensible people will continue to find pleasure in traveling leisurely through picturesque countries by automobile, lingering in some more favored spot and making the most of every furlong of the way; but this is altogether different from the present madness which sacrifices everything to speed.

The "sport" of automobiling, which is being "boomed" by the daily press and promoted by many of the clubs, is leading up to a craze which must soon exhaust itself. Excess brings satiety, and one who tires of a pleasure seeks other forms of enjoyment. It is to be particularly regretted, therefore, that so many of our daily papers are blindly encouraging the vicious tendencies of the automobile movement and thereby stimulating manufacture along false lines, laying all stress upon sport, speed and records, and slighting the practical field of the automobile—which is the world of rational pleasure and of economical work.

The "sport" of automobiling, in its present exaggerated and chaotic form, cannot endure. Human law and human nature forbid. The pleasure of automobiling, however, will endure, and it will grow as the other wanes.

Will the record breakers and the builders of record breaking machines sober up and get down to serious business, or must others clearer sighted and better balanced be depended upon to undertake the popularization of the automobile?

Direct Bevel Gear Versus Chain Drive.

The good showing of the Napier racer in the Gordon Bennett Cup race has caused some of the English periodicals to explain the performance on the ground of superior drive construction. One of them makes the statement that the run has proven that a direct bevel gear drive is not destructive to wheels and tires, which constituted the "dismal prognostications of some experts."

All racing cars of the heaviest type of French make that have come to our notice are equipped with chain drive—side chains at that. The rear axle remains stationary —i. e., it does not revolve—wherever this system is employed. Lighter racing machines of French make, some of which finished the Paris-Vienna race, were bevel

gear driven. In fact, quite a proportion were of the latter class.

We believe that the builders of this, the first high powered machine with a chainless drive, weighed off the merits and demerits of bevel gear and chain drive very carefully before taking this step, which was a departure from their everyday practice. A well designed and well proportioned bevel gear drive is probably not so apt to break down as the weakest link or pin of the many that make up the side chains of such a machine. Although chain repairs on the road may be readily accomplished, the slightest loss of time in a race is fatal to the chances of winning. Chains when running at excessive speeds also have a tendency to jump the sprocket and bring about a bad wreck. Furthermore, in the Paris-Vienna event the operation of cleaning chains had to be performed outside of the control stations, and the time consumed in doing this was calculated as running time, another great drawback of the chain drive when applied to racers.

The recent big event does not go to show that the direct drive is in every way superior to the chain despite its inflexibility, because the car that made the best time in the heavy class was chain driven. Vehicles built for one particular race are not designed with any particular view to demonstrate the merits or practicability of any system of drive. After the event they are frequently much in need of repair, and sometimes fit only for the scrap pile. What is wanted to determine such matters is not speed contests, but endurance runs of 400 miles or more, with competent observers assigned to every contesting vehicle. A thorough inspection of the automobiles participating, by a committee of engineers before, during and after the contest, would throw light on many a dark subject.

That long tours over roads, parts of which are bad, may also cause breakdowns and failures, many participants in the touring section that followed the racers can testify, quite a number of whom were obliged to abandon the run from causes beyond their control.

That a direct bevel gear drive without gear reduction in the change speed box is more efficient than a direct drive to the countershaft, to which the master gears of the differential are secured, and side chains to the drivers, we are well aware of. At the present time, however, we are not advised whether in the Napier the direct bevel gear drive excludes the intermission of other gears. In the United States the intermission of variable speed gears on the high speed would not be considered good practice on a racer. The French Renault vehicles drive direct on the high gear, and other prominent French manufacturers are now following suit.

The Proposed Technical Association.

The suggestion made in these columns a short time ago that an organization of automobile engineers would prove beneficial to the industry has met with considerable favor, judging by the letters of approval which we have printed.

In these letters various ideas have been advanced as to the character and scope of such an association and we hope that we shall hear from others during the summer months, so that by fall some definite steps looking to organization may be taken. We believe the art of automobiling to be far enough developed now to warrant the formation of a technical association devoted to its interests, just as the older branches of manufacture are represented. The makeup of a motor vehicle involves an aggregation or combination of many separate branches of engineering, for example, steam engineering, gas engineering, carriage building, mechanical engineering and various branches of electrical engineering and the practical combination of these elements to produce an effective and economical self propelled vehicle, requires adaptation and skill of a high order, which is certainly not possessed by the ordinary expert in any one of these spheres.

For instance, a mechanical engineer who has had little or no experience with automobiles would have no facts or data to guide him in applying a gasoline or other motor to a vehicle of given dimensions. He would be "all at sea" in attempting to design the transmission devices, and in making these latter variable to produce a smoothly running machine capable of negotiating different grades with the least loss of power. In preventing vibration, allowing for climatic and other influences, and providing for the thousand and one conditions of this new means of transit he would be reduced immediately to the first stage of experimentation, which has long been passed by a large and growing number of men connected with the automobile movement who have gained sufficient knowledge to enable them to cope with the latest and most advanced problems with which the industry is now confronted. In order to preserve this large body of special knowledge and render it directly available for all serious students of the subject, it is essential that an organization should be formed, thinking minds brought together for common discussion, papers prepared and read and the general attention focused upon the problems that from time to time require engineering solution.

A society of this kind must, of course, be absolutely independent, in no way subservient to any commercial body. Its expense of maintenance need be but trivial. It is only necessary to point to the success of other scientific bodies having similar objects to prove that it is quite possible of accomplishment. Further discussion will be welcomed.

The Failure of Body Springs.

One need only make the rounds of the repair stations in our large cities to observe that a fair percentage of the automobiles that are out of service are undergoing repairs because of the fracture of one or more leaves of a body spring. In the New York-Buffalo endurance contest last September many springs were broken. Although the operators managed to keep the wheels going, machines with broken springs were not in a condition to make a good showing.

A little over a year ago a gentleman made the run from New York to Chicago in a French gasoline automobile. Two or more springs were fractured, one of them several times. Others have had similar experiences on long distance trips.

The design of a body spring may be such as actually to invite fracture. Most of them are too light, too narrow, and have but one main leaf. The ends of the main leaves, instead of being rolled over to form an eye, are ofttimes hammered down to one-half the proper thickness and then forked. The appearance of such a spring is good, but it is not adapted to the hard service which the automobilist requires.

The French employ springs with wide leaves and turn the ends over to eyes. They also employ long springs, 36 inches being about the average length. While their springs are not exempt from breakage, they are less liable to give out than most of our own.

French practice also can well be improved on. Why not use two thin wide main leaves instead of one thick leaf? The former

can be rolled to an eye more readily than the thick one, and are therefore less liable to crack where the bend is made.

The subject of material has a great deal to do with satisfactory suspension springs for motor vehicles. Not long ago the representative of the builders of a heavy truck complained of the material used in the springs made by a firm of well known spring manufacturers. These trucks are known to make about five trips to every three of horse drawn trucks. Taking it for granted that the spring maker delivered springs that would have proved ample in a horse drawn vehicle of like weight, their failure may be attributed to the higher speed and severer shocks. All of this goes to prove that better material must enter into motor vehicle springs in the future. No desire on the part of manufacturers to economize should prevent them from at least making the long leaves of high grade steel. One of our leading manufacturers employs Swedish iron for the main leaf. No doubt nickel steel of suitable grade will open up new possibilities in this direction. It is "up to" our manufacturers to exploit this material.

Runaway Automobiles.

Runaway automobiles have been quite numerous of late, two being reported in the present issue. In one case a mischievous boy was responsible for the trouble, having placed his hand on the lever while the chauffeur was occupied underneath the machine. In the other case the owner had stopped his vehicle and applied the brakes. No sooner had he entered a house than the machine is said to have started down the street. Reports have it that, but for the efforts of a policeman, who turned the machine into a trolley pole, it would have passed through the plate glass window of a store.

Automobiles, being inanimate, do not take fright and dash down the street. We must, therefore, look into the causes that bring about this accidental starting and try to remedy it while we also take measures to prevent the small boy from playing such costly pranks.

Street gamins soon learn that thrusting the throttle lever of a steam carriage forward will cause the engine to run. If the automobile belongs to a physician who employs it to make professional calls the boys of the neighborhood are all the more likely to learn how to produce a sensation at his expense. We would therefore advise users to attach some form of locking device which requires a key to open it.

If the motor is of the hydrocarbon type and the control devices are such that applying either the foot or the hand brake automatically relieves the main clutch, it requires but the release of the brake lever to start the vehicle. Here it would be wise to lock the brake lever, and, if the application of a suitable device presents difficulties which the user cannot overcome, he should stop his motor and remove his switch plug. All gasoline vehicles should be fitted with such a plug, which is preferable to the ordinary switch for this and other reasons.

The Proposed Chicago-New York Run.

The Automobile Club of America has shown wisdom in declining to co-operate with the Chicago club in the organization of a Chicago-New York endurance run. The New York club has an event of its own on hand which will absorb all of its attention between now and November 1. Every new test of this kind makes heavier demands upon its organizers, owing to the increase of detail rendered necessary by the growth of technical knowledge among all classes interested in the progress of the industry. The looseness with which earlier events have been conducted will not now be overlooked. Better business management and more efficient engineering co-operation are now needed to insure the complete success of a public event of this kind. The decision of the club is therefore sound. It has its own laurels to win.

As to the Chicago club, it would seem only prudent on its part to gain some experience in minor undertakings of this sort before launching out into continental competitions. A modest success is better than an ambitious failure and is unquestionably the best guarantee of future performances. The 100 mile test is by no means a back number yet.

Doctors and the Speed Laws.

The doctors of Buffalo, N. Y., who use automobiles in their practice have come into collision with the anti-speed law. Three of them were arrested the other day for exhibiting too much professional zeal in the effort to reach their patients quickly and were brought before a magistrate and fined. The president of the Buffalo Automobile Club, who is himself a physician, has interested the club in the matter, and it is more than likely that the pressure thus brought to bear may influence the police to relax the law to some extent in favor of the physicians.

In Detroit recently a physician who had been arrested for running his automobile at illegal speed was discharged by the magistrate when he explained that he was answering a hurry call. Elsewhere similar lenity has been shown. Surely a reasonable latitude must be allowed in such cases. A physician who habitually ran his automobile about the streets at dangerous speed would unquestionably be classed as a lawbreaker, but one who only occasionally and on urgent need took this liberty would be classed as a law abiding citizen and a humanitarian.

The Ever Ready Match.

The ever ready match in the automobile barn did its deadly work again at Far Rockaway, Long Island, Thursday. A stableman, who had not been instructed in the use and care of gasoline, is reported to have carelessly dropped a match on the floor while cleaning an automobile. Whether the match ignited gasoline which had been spilled on the floor and which then communicated with a can on the floor is not known, but the barn and contents were consumed. There is danger enough in the handling of gasoline when proper precautions are taken, but in the hands of those who are utterly ignorant of its peculiarities it is death and destruction. Owners of automobiles should by this time see the folly of entrusting their machines to incompetent persons for storage or care, and should satisfy themselves that their own employees are instructed thoroughly in the safe handling of gasoline. The list of fires due to carelessness in automobile barns is growing altogether too long.

Mixed Fuel for Explosion Motors.

The experiment made by the well known chauffeur, Réne de Knyff, in the Paris-Vienna race with a mixture of alcohol and petrol as motor fuel again revives the question of the future fuel for automobiles. As has repeatedly been pointed out in these columns, the question is to a large extent geographical. Conditions vary in the different countries. By reason of the scarcity and high cost of gasoline in France and other European countries, the development of the industry is in greater de-

gree dependent upon the utilization of some cheaper and more easily obtainable fuel than it is here, where gasoline is still within the bounds of reason in price and where an abundant supply of cheap kerosene is available once this safer hydrocarbon is adapted to consumption in steam and explosion motor automobiles. Alcohol is relatively a poor fuel, and it is more than likely that attempts to combine it with gasoline would result in a loss of some of the desirable qualities of one or both.

Whatever may be the doubts of our foreign coworkers, therefore, in regard to the fuel problem, here the goal of improvement in this line is distinctly marked. It is kerosene for both steam and explosion motor automobiles.

"Automaniac."

There seems to be need of a term to designate those speed crazed paranoiacs who are now doing so much to bring the automobile into disrepute. Various terms are loosely applied to the new terrors of our streets, but a new compound would be desirable. We suggest the word "automaniac," which is in harmony with several well known words of Greek derivation already rooted in the language as descriptive of victims of diseased and abnormal appetite (dipsomaniac, kleptomaniac) and conveys a strong and true picture of the mental state of the worst of these offenders against law and decency.

Ignition Batteries

By Albert L. Clough.

Ignition batteries for automobiles are a source of considerable trouble and vexation and while a great many of them are being replaced by magnetos or dynamos driven from the engine, yet they still constitute the most common source of the igniting current. A few years ago wet batteries constructed with unbreakable jars and carefully packed in wooden boxes were a common source of the current in gasoline carriages, but now the dry battery, owing to its smaller bulk and cleanliness, seems to be almost universally used. Wet batteries were heavy, bulky and somewhat liable to slop, no matter how well they were put up, but on the other hand they were long lived, reliable and powerful and could be renewed when exhausted by long service. Perhaps no more reliable source of igniting current has ever been found than the well known type of zinc, copper oxide, potassium hydrate cell with metal jars. These batteries have very little local action, large current capacity, low internal resistance and a constant though not high electromotive force. They are very serviceable batteries and where room is available for them and the weight not an objection they are a decidedly serviceable form.

"DRYING."

The dry batteries which are offered for sale are mostly of the sal ammoniac type using carbon and zinc, and as everyone knows, these batteries are "dry" only in name, the cells being filled with a paste of which sal ammoniac is in most cases the active component. This paste is dry enough when the cell is sealed to prevent slopping and at the same time moist enough to allow a certain freedom of action of the materials for circulating and causing depolarization. When this paste becomes dry by age or by heat the contents of the cell become almost solid and there is no freedom of action of the materials and no depolarization. In the drying of this active material it shrinks to a considerable extent and may fall away from the zinc shell of the battery and from the carbon electrode and thus increase the internal resistance of the cell. This drying of so called dry batteries is the greatest cause of their failure and accounts for the general preference for new cells just from the factory.

Although it is claimed that these dry cells will work in any position, it is a matter of common experience that they work very poorly lying on their sides. For if there is any space between the shell of the battery and the top of the active material, or if any space is formed by shrinkage, when the cell is laid upon its side the empty space will be found between the filling and quite a large segment of the zinc for its full length, and there is thus a good deal of zinc withdrawn from action.

PERHAPS THE WORST TROUBLE

with dry cells outside of their drying up is through the carbon actions becoming faulty by being corroded by the sal ammoniac. This salt is very destructive to brass or copper, and carbon is a porous sort of material and, unless especially treated, will soak up the sal ammoniac by capillary attraction, and the brass connection screw is likely to become corroded at the point where it joins the carbon, and thus add to the internal resistance of the cell, even to the extent of opening the circuit. It is impossible to avoid an electrical connection between the carbon and the brass binding screw, and unless the carbon is thoroughly treated to make it non-absorbent and other precautions taken, the carbon connection will become faulty. Wherever there is any appearance of corrosion about the binding screw, as evidenced by the presence of a green color on the metal, it is almost certain that the contact is in danger of being destroyed.

TESTING.

Batteries fail through the two causes of loss of electromotive force and increases in their internal resistance, the former defect being due to a failure of the depolarizing action, and the latter through the drying up of the cell or the formation of bad contacts within it; and, in order to test a battery and determine its condition, these two points should be ascertained. A battery gauge should be so constructed as to give by a single reading information as to the electromotive force of the cell and its internal resistance. It is useless to test a cell with a voltmeter which reads in volts and simply informs one as to the electromotive force, for these instruments take no appreciable current, and almost any cell, even if badly played out, will show a fair voltage on an open circuit. On the other hand, it is equally bad to test a cell of battery by means of an ammeter, which is an instrument of almost no resistance and allows the cell to pass a very large and harmful current which would soon exhaust it. A great many batteries are injured by testing by means of very low resistance instruments, which run them down before they are ever used. A proper battery gauge should have a medium resistance, low enough so that the instrument shall pass an appreciable current, large enough to make known by the indication on the scale if the cell has a large internal resistance; but it should not pass enough current to rapidly polarize the cell. A good battery gauge, in fact, is of such resistance as to somewhat reproduce the conditions under which the battery is to be used, and its reading is closely in proportion to the combined effects of electromotive force and internal resistance, and thus enables one to predict somewhat the performance of the cell when it is doing actual work. Battery gauges are usually graduated in arbitrary units, and one should not use with confidence any gauge that is calibrated in volts and amperes. The arbitrary units used in the calibration of an ordinary battery gauge are useful for purposes of comparison only, but after a little experience with a particular gauge in testing any particular type of cell, it is possible to quickly gain an idea of what condition it is in.

The alleged great strength of cells is often demonstrated to the unsophisticated by short circuiting a cell through an ammeter of almost no resistance. There is an immensely high ampere reading at first, 15 or 20 amperes perhaps, but the needle immediately begins to sag down toward the zero mark as the unfortunate cell becomes more and more exhausted, until the current becomes a few amperes only. If one sees a battery tested and the reading rapidly falls off, it is safe to conclude that either the instrument is of too low resistance and is being used for effect or through ignorance or that the cell is not a good one. After practice with a battery gauge it is possible to tell somewhat, by the rapidity with which the reading of a certain cell falls off as the circuit is kept closed, the amount of service which may still be expected from it. The ordinary battery gauge is intended only for the testing of a single cell at a time and such

an instrument should not be subjected to the current of an entire battery at once.

No amount of testing will guarantee satisfactory service from dry batteries, but it is hoped that they may be greatly improved in the future. The sealed boxes of dry cells containing a number of elements with connections made inside the box are not to be recommended, as a defect in a single cell generally causes the whole to be discarded, nor can the use of tin for the containing cases be called good practice, owing to danger of short circuits. If dry batteries are to be used, they should be bought in the form of separate cells

DIRECT FROM THE FACTORY.

The dealers, especially the small ones, keep them in stock too long. The cells which form the battery should be united by flexible connections and they should be so packed that no shaking of the cells, relatively to each other, is possible. A single cell in a battery made up in this way may readily be replaced when found defective.

A RECOMMENDATION.

If someone should place upon the market a small type of unbreakable and unspillable copper oxide battery of say ten cells, securely contained in a good wooden box with removable cover, it is believed that it would become popular and useful.

The Causes of Automobile Accidents.

By M. C. Krarup.

(Continued from last issue.)

Having seen that those mechanical features of automobiles which chiefly bear upon the security of traffic do not point unmistakably to the enactment of a legal speed limit as the most urgently needed safeguard, we pass now to other features whose importance depends upon facts of less definite character not so commonly known and appreciated in this connection.

They may be classified, in the order of their importance, as (1) physiological, (2) moral, (3) legal, and (4) historical. The classification is, of course, to some extent arbitrary, but it may serve the purpose of illustrating the many complications and ramifications of the whole problem, which, after all, point to an extremely simple solution.

It may be difficult to decide whether new dangers to the traffic are introduced in greater number through the possible moral delinquencies of automobile drivers or through a certain physiological obtuseness to the approach of an automobile, to which all are more or less subject, and which results from the nature of the human senses, on one side, and from peculiarities in the contours, the motion and the noises or noiselessness of automobiles. Which is the more prolific source of accidents is, however, comparatively irrelevant, so long as it is admitted that both exist, and that one has been introduced through automobiles and the other much aggravated.

It is in physiology a universally conceded fact that all the senses depend upon continual change for reaching the consciousness of the sensing individual. Upon first entering a room where there is an odor of gas, of garlic or any other odorous substance, one becomes strongly conscious of its presence, but after a short while the consciousness wears off, except in so far as fortuitous air currents may waft it into the nostrils more strongly at one moment than at another. Sight is subject to the same law. It is only by continuous (though slight) variation of the visual angle that one keeps an object in view. Staring absolutely fixedly at the same point may even produce a trance or coma. That old sage, Pythagoras, knew that the same applied to hearing, for he speaks of the "harmony of the spheres, which we fail to hear because we are always in it." It is this which renders a monotonous voice so trying. It is a strain to remain attentive to it, because the modulations are insufficient to challenge the sense of hearing. Feeling, in the mental as well as the physical meaning of the word, obeys the same law. At the moment a man's arm is touched the sensation of the touch is vivid, but allow the finger to rest motionless in the same spot and before long all consciousness of feeling its presence disappears, unless kept alive by the pulsation (a lifeless object suits the experiment better than a finger) or by a difference in temperature; and the latter is in itself a cause of motion and interaction between the touching parts. With reference to automobile accidents sight and hearing are, of course, the most important senses, and it may be interesting to follow the law of motion, or change, into some of its consequences before attempting to apply it to the subject in hand. When looking into a landscape without specially "innervating" the optic faculties for observation—as when the mind is engaged with other things—only the moving objects in that landscape rouse a dim consciousness. The rest is a blank, but the moment the focus of the eyes is varied the immobile objects, too, reach the recording apparatus in the brain. Wild animals understand this fully as well as men. They don't move crosswise of the path of other animals or men whose attention they wish to escape. They keep motionless or move stealthily exactly in the visual line, so that all change in the visual picture shall be imperceptible. This is all very well understood, but that it holds good throughout the whole range of differences that may exist between successive visual images is perhaps less clearly perceived. That the consciousness is aroused in proportion to the interruptedness of sensation, and that all forms of continuity in the sense images lulls consciousness to sleep is a physiological fact which is appreciated by intuition to some extent, but is not very deeply or generally comprehended.

A popular application is the changeable electric sign used for commercial purposes; but even the wideawake class of advertisers who use this method have so far neglected to use an irregular cam movement in their switch apparatus to disturb the regular rhythm of changes which greatly diminishes the effect of their devices—though the change of wording largely serves the same purpose. Some of them have apparently discovered that slow changes are better than rapid ones, but perhaps chance or reasons of economy are accountable for the discovery. The effect of rhythmic repetition seems to be that the perceiving mind becomes conscious of the rhythm while losing gradually consciousness of that which causes it. The simplest rhythm is a regular repetition of the same sight or sound at unchanged intervals; next follows the crescendo (and decrescendo), which seem to play a very important part in inducing automobile accidents. As said before, continuity of the sensory images is the great source of danger, and this continuity is produced by automobiles to a degree heretofore absolutely unknown in street traffic. Even the noise of a gasoline vehicle is a simple repetition of the same sound, and while repetition, of course, constitutes an interruption and renewal of the sound images which would conform with the conditions for distinct perception if the intervals were long enough, and each of the succeeding sounds were not practically identical with the preceding ones, it produces a continuous sensation (equal to unconscious sensation) when one sound follows before the previous similar sound has become obliterated. In other words, there is a limit to the value of "interruptedness" for rousing consciousness. If the interruptions are sufficiently rapid to confuse sensation, there is formed one continuous image of sight or sound, or both(as by the succession of cinematograph pictures), and if they are also identical in character the image is without motion or change; that is, it impresses the individual only momentarily, and fails to reach his consciousness with the vividness required for calling out those associations of ideas which would prompt him to take action with regard to the object.

If the object is an approaching automobile, and it fulfills the conditions mentioned, there is, naturally, one moment when the image of the automobile is first projected upon the retina of the eye, and one moment when the sounds emitted by it first strike the tympanum, and at those moments consciousness of danger, or the necessity for "looking out," is doubtless in most instances created, and will keep the individual on the alert till the object is past. The situation would be unbearable if this were not so. But—and this is the

gist of the argument—in too many cases the first impressions are weak and fleeting, either because the person's attention is otherwise engaged or because the sensory images in their incipiency are so unobtrusive as not to become associated with ideas of personal concern, and are dismissed from consciousness, leaving the person disarmed against the crescendo of the same sensory images produced by insensible gradations as the distance between the automobile and the person diminishes. It may be fanciful to say that the effect of a crescendo under such circumstances is hypnotizing. The word is probably not appropriate unless under very exceptional conditions. But it seems well within reason to contend that it may be extremely confusing for a person who has seen an automobile coming toward him without being conscious of it, and who has heard the same automobile without knowing that he heard it—suddenly to be awakened (by the great changes in sight and sound which accompany close approach) to realization of his position. He is in all probability very much worse situated than he would have been if the sensory images had not reached his eyes and his ears at all until his consciousness was ready to absorb them and interpret them. They would then strike a blank retina and a calm eardrum (blank and calm in relation to the automobile, at least), and the sensory organs, if otherwise unimpaired, would perform their functions as sentinels of his organism without confusion. An additional danger arises from the unfortunate fact, that a person under the conditions described appears to others as if he saw and heard, in the ordinary acceptance of these words, and the driver of the automobile receives the impression that such is the case and expects him to take care of himself.

After one of the first fatal automobile accidents in this country (Mr. Green killed by an electric cab in Chicago in 1899) testimony was given by the driver to the effect that the victim appeared perfectly normal and cognizant of the approach of the vehicle, and since then a great many other cases have supported the theory that "subconscious sensation," superinduced by the peculiarities of automobiles, is at the bottom of a high percentage of similar accidents, mainly to pedestrians.

It now remains to be pointed out wherein these peculiarities consist. As already referred to, at every turn the front of an automobile points in one direction while the vehicle moves in another, and the only indication to the eyes of the changed direction of the vehicle is an inconspicuous turn of the front wheels on their pivots. Moreover, usually only one of these wheels is visible. Just on occasions when there is question of a narrow escape, at best, this may cause great confusion, as all are accustomed to associate the turn of a vehicle with entirely new relations between its front (horses and foretruck) and rear portions. Even those perfectly familiar with automobiles find it difficult to foresee, with any degree of accuracy, the path of an automobile making a swerve or a turn, when they stand on the ground beside it. There is not sufficient change in the visual impression, as between the automobile when it goes straight forward and when it turns. All automobiles have this feature in common. The few German and Austrian electric vehicles, driven by a "fore carriage," which turns on the fifth wheel principle, form a rare and insignificant exception; insignificant because after all it is the absence of the horses and the shaft and their turn in relation to the vehicle, which announce a change of direction most conspicuously.

When an automobile moves straight forward nothing changes the visual impression of it except the distance from the beholder, and this change is one of imperceptible gradations, especially when the speed is not very high. The driver sits practically motionless; the wheels rotate in their own plane, presenting virtually no picture, involving motion until very close to the observer. The workings of the motor are hidden. The sounds vary from a soft purring to a monotonous and sustained shriek in the electric vehicle, from no sound at all to a regular succession of muffled puffs in a steam vehicle, and from almost inaudible puffs to an infernal rasping, but withal usually monotonous, noise of gears and exhaust in the gasoline vehicle.

Everybody living in large cities has experienced the sensation of jumping for his life when an automobile was suddenly upon him (or her). The alarm of the squawk or the gong recalled him to his senses when it was all but too late. And everybody who has had this experience a few times will readily assert that he would have noticed a horse drawn vehicle by sight and sound under the same conditions of speed and distance under which the automobile driver found it necessary to sound his alarm. Surely the sense of sight must have been tricked. In regard to the noise it might be said that it is simply insufficient and is drowned in the other street noises; and this may be partly true with reference to noiseless steam and electric vehicles, but it remains also true that a noise of a less continuous character, though it be smaller in volume, is not easily lost in the din or wasted on the human ear. This is in fact the rationale of the alarm, the nerve racking, terrorizing horn or the brutal gong, which has not a friend left among either automobilists or non-automobilists, but is kept in commission through the sheer intellectual apathy of those in charge of public safety. It is hardly necessary to specify in what respects it is a faulty device, except to emphasize that its efficiency to avert accidents is reduced at least one-half by having its use or non-use decided solely by the automobile driver's judgment and watchfulness, these being qualities which would render all traffic regulations superfluous if they existed in such a degree as to be depended upon. It is reduced still further by its tendency to strike terror to the timid, the preoccupied and to those whose senses have been tricked by the peculiarities of automobile locomotion. An alarm, to be effective, should be continuous in action, and interrupted in quality and quantity, and this refers to sight alarms as well as to sound alarms. The continued and irregular clank of the bell on a fire engine is a perfect alarm signal to the ear, but it is a nuisance and out of question for the general traffic. Any musical or semi-musical note becomes burdensome by repetition. Fortunately there is an example on hand which shows exactly what an alarm should be, or rather by what means safety in street traffic is best obtained. As it happens, this is furnished by the horse drawn vehicle. Nothing could be more appropriate, when dissatisfied with the security of automobile traffic as it is, than to find the method of correcting the evil in just those elements of the traffic which the automobile displaces, and the security of which forms the basis of comparison for declaring the automobile unsafe.

In the horse drawn vehicle is found exactly that which the automobile lacks (as it is at present constituted) to make it conform with the physiological requirements for the security of traffic, and, though it was a foregone conclusion that this must be so, as soon as it was admitted that physiological requirements existed, it has not been very broadly realized. It comes almost as a surprise to discover that the horse is a first class fender and alarm which compels the attention of the ear and the eye and the consciousness. It is large and conspicuous; its head is well above the pedestrian's natural horizon, and moves up and down, the motion being large or small, almost in proportion to the rapidity of the gait. The motion of the legs is one of pronounced "interruptedness." The resounding thump of its hoofs against the pavement is an interrupted sound of non-musical character, and never becomes rapid enough to be perceived as a continuous sound. Moreover, it changes in cadence and strength with the speed. The cadence is strongly irregular at all fast gaits. Referring to the physiological theory it is seen that it conforms closely with all the requirements which are neglected in the automobile. That the latter is low in front is also a strong point against present construction, and the worst sinner in this respect is perhaps the electric hansom cab, which always impresses one as farther away than it is.

What it means for the safety of traffic to place the responsibility for it chiefly upon the drivers of the automobiles, while curtailing the faculties for taking care of themselves of the other elements of the traffic—pedestrians and drivers of horse vehicles—is perhaps best made clear by a

supposition in figures. Grant that in 10,000 contingencies in ordinary street traffic from which accidents might occur if somebody did not look out sharply and obviate the threatened occurrence by suitable action, there are 200 cases in which at least one of the parties to the possible accident fails to observe the condition right. This would be one out of every fifty cases, allowing that in forty-nine cases out of fifty both parties are alert and do the right thing. In those 200 cases, however, the onus of avoiding the accident falls undivided upon one of the parties, namely, him who is supposed to see things clearly as they are. Say that the one who does see the situation is in fifty cases the driver of the automobile and in the other 150 cases the other party, the threatened victim. It is obvious that out of these 200 cases in which at least one party fails to observe right or act right there must again be a percentage of failures by the other party in whom the whole chance for avoiding the accident is now vested. This percentage should—by the rule of chance—be the same as before, or one out of fifty cases. In other words in four cases, being one-fiftieth of 200, both parties fail to observe right or act right—and the accident takes place. Four accidents out of 10,000 possibilities! But the possibilities are very abundant. Suppose now further, however, that the peculiarities of automobiles—entirely apart from high speed, inebriated drivers and mechanical defects—affect the faculties of observation and judgment in a manner not considered in the above figures.

We are speaking of the physiological factors alone, which are ordinarily left out of consideration. Suppose they are inactive in forty-nine cases out of fifty, they would yet increase the number of cases in which only one party is alert, raising it from 200 to 250 (not to 400, because they would not affect the 150 automobile drivers who are supposed to overlook the danger). And, by the same percentage, they would produce four new cases (being one-fiftieth of the 200 (150 plus 50) non-drivers in whom the whole chance for avoiding accident would be vested under the circumstances) in which neither one nor the other party would observe right or act right, and which would, therefore, result in actual accident. The total of traffic accidents would be doubled. Eight out of 10,000 possibilities, instead of four, counting nothing for the hundreds of instances when accidents are narrowly averted with no other damage than a disagreeable scare.

It will be noticed that speed plays a subordinate part in the class of accidents which have been discussed in the above and ascribed to physiological factors, and also that the remedy should naturally be sought in suitable substitutes for the thump of the horse's hoofs, the motion of its legs and body, the height of its head. Gay colorings are also undoubtedly preferable to sombre effects.

Factors which come under other classifications, but which should also influence the methods of traffic regulation, may be passed more briefly in review, as their relative importance may be readily recognized when merely mentioned.

The moral factors refer mostly to the drivers of automobiles, though also somewhat to those owners who do not drive but employ chauffeurs, for whose actions they become partly responsible. It might seem at first glance as if nothing new had been introduced for consideration by the mere fact that some automobile drivers are well intentioned and that others are less so; that some become habitually inebriated and others never; that some are carried away by vanity and in foolish self consciousness forget all cautious regard for their fellow creatures. Similar distinctions, of a moral nature, may be made among drivers of horses, yet the world has been obliged to face dangers arising from this cause, being simply outwitted as to finding suitable, direct means for averting them. They are accepted with resignation like other evils due to the sinfulness of human kind and to the necessity of society at large being indulgent, lest its most active and valuable members should incidentally be made to suffer under the austerity of a condition too ideal for daily comfort. Requiring some means of restraint for the unruly, however, the flexible Anglo-Saxon mind has devised—through some sort of intuition—the unenforceable legal regulation for just this class of offenses. By a spurt of energy, on the part of somebody, it enforces this class of regulations or punitive action on special occasions, when there seems to be urgent necessity for doing so, but ordinarily lets them go by default; enforces them against one class of people and ignores them in the case of others. In the seesaw between license and suppression which results it is sought to realize a tolerable mean of moral responsibility. To this class belong the speed regulations for drivers of horses, and the elastic rules under which a charge of disorderly conduct may be preferred and maintained in a police court. To the extent to which they are enforced with impartiality the wilful and reckless are obliged to cultivate inhibition of their immoderate impulses and respect for the rights of others, and through this fact society at large becomes mainly responsible for any existing condition. The press, the legislatures, the established executive government and the judiciary are sponsors for the actions of that great majority of people who are as good as they must be, and no better. The automobilist who takes gay women out for a promenade, stops at every road house for refreshments, and allows himself to become the victim of several species of excitement while in charge of a powerful machine, is not a criminal. He has simply not been made to understand that society will not tolerate the dangers to the traffic incurred by such action. He has not been subdued by public opinion among his set, because such public opinion has not yet been formed or actually supports him. Having few moral impulses instilled into him by education, he accepts and obeys only those which are thrust upon him with sufficient, compelling force from without. His intelligence works in similar grooves. Driving a horse under circumstances of the same kind, he knows better how far he can go. He knows he must figure with the uncertain will of the horse in order to escape accident to himself. He knows that when the animal, under the vacillating guidance of a clouded mind, strikes from a trot into a gallop, he becomes the object of censuring observation, and possibly interference. That a change of gaits is distinctly visible is indeed the principal feature in horse locomotion that renders speed regulation in a measure practicable. Most horses acquire habits which protect the driver and the traffic in general to an extent which permits not only vicious persons, but also those entirely unfamiliar with horses, to drive them without extraordinary risk. They keep the road, they lapse into a slower pace when urging ceases, they avoid obstacles. The manipulation of the reins is simple compared to operative movements required for the guidance and speed control of automobiles. Altogether the conditions are such that society has obtained a tolerable degree of safety against persons of loose habits and weak principles, through the makeshift expedient of legal speed regulations and the pressure of public opinion. The advent of the automobile has changed the situation entirely with reference to this source of danger for the traffic, and by its urgent demand for new and special forms of regulation for automobiles society has signified that it wants more security, while the frequency of serious accidents due to the mental and moral traits of automobile drivers shows that adequate means to this end have not yet been discovered; in other words, that the naive recurrence to speed regulation fails to fit the new conditions. It may help to see why, when we imagine an inebriated or vicious elephant roaming the streets. What has saved the situation until the appearance of automobiles was that the drunken man drove a sober horse. In automobilism, when the man is drunk or careless, the machine is so, too, because it has no will or habits of its own. Its speed and ponderosity both get blind staggers. Should not this be something deserving of special recognition in the methods adopted for traffic regulation? Is a "plain drunk," who is subject to arrest for disorderly conduct when his weight is 200 pounds and his speed 5 miles per hour—is he still a "plain drunk" or a serious menace to society, when his weight becomes 2,000 pounds and his possible momentum 100,000 foot pounds or

more? The "glorious sense of power" which so many persons unaccountably acquire when they have purchased the product of the ingenuity of somebody else, in the form of an automobile, seems in itself to be a somewhat threatening factor, unless society can succeed in instilling an accompanying sense of responsibility, guaranteed never to be left at home. Nero, Caracalla and Heliogabalus are said to have been very nice young men of urbane speech and conciliatory manners until a similar "sense of power" was thrust upon them.

Under the head of legal factors which should properly be considered in all efforts for establishing security on public highways, there is not any except those of recent creation which need to be formally removed in order to arrive at the best possible solution of all difficulties. A legal system like that of this country where common law and statute law go hand in hand, supplemented, moreover, by the jury institution and through "authentic interpretations" of the law by the judiciary, is exceedingly elastic, and lends itself readily to new methods for regulating new conditions. It is usually conceded that legal provisions relate only to that portion of human conduct which may be enforced, if necessary, the rest constituting the province of morality, and is left to the care of the home, the school, the press and other moral agencies. Whether the impossibility of enforcement relates to physical causes or to the unwillingness of the state to interfere with the privacy of personal life does not in this respect make any difference. The law will not proclaim an idle mandate, or rather, it should not do so, according to the best authorities on the subject, and here it is unfortunate for those who advocate definite speed limits for automobiles, that no means have yet been perfected for determining by direct observation at what speed an automobile is running at any given moment. Tachometers exist, but they do not permit readings from outside of the vehicle. In order to ascertain the speed, it is necessary to time the vehicle over a known distance and calculate the result. No change of gait assists in forming a reasonably accurate judgment, and, in fact, estimates of automobile speed are notoriously unreliable. A large machine seems to go slower than it does; a small machine seems to go faster. A noiseless machine seems to go fast, when its approach startles you, and slowly when you watch it deliberately; above a certain speed (or perhaps this is variable, too) the machine always seems faster if noiseless. High motor speed produces an impression of vehicle speed. A two or four cylinder motor likewise gives a speedier impression than a single cylinder motor, provided in both cases the exhaust is audible. Doubtless it is quite simple to arrange a system by which an automobile would always announce its speed by the sounds produced by a continuous alarm, and before long the public and the police would, by a little practice with a watch in hand, be able to detect speed unfailingly, but nothing of this kind has yet been done.

How easily legal entanglements arise, when it is attempted to specify by statute the precise acts of an automobilist, which create civil or criminal liability, is exemplified in New York State, where the first law passed on the subject was nullified through the inability of injured parties to obtain justice under it, and the second on a question of the jurisdiction of magistrates under a decision by Recorder Goff, while the Supreme Court, in the case of Thies vs. Thomas, declared the speed restrictions of the second law irrelevant for adjudicating the question of civil liability for damages, taking the ground that such liability must always hinge upon the question whether the automobile driver had acted as a good and prudent man under the circumstances, everything considered, speed restrictions or no speed restrictions. Violations of the speed regulations could, under this decision, apparently never become the basis for more than a specific charge, and their observance could never exempt a driver from the full responsibility for lapses in his conduct and caution on other points. The decision, in asserting the supremacy of common law principles, suggests the historical and local factors, which should be considered in the driving of automobiles and its regulation. Matter of fact driving at fair speed and little apparent heed for others, which three years ago would have scared nearly all horses in New York or Long Island, causes no comment or disturbance today. But in other localities, where automobiles are still a new feature to men and beasts, such driving may be as reprehensible now as it would have been everywhere then. Traffic regulation, which leaves this historical change of conditions unconsidered, must be imperfect in the measure as its rules are positive. Perhaps the historical factor asserts itself strongest on the subject of the "right of way" and the presence of mind that may be expected of wayfarers when they meet a machine of whose action, capacities and reliability they know nothing, except possibly from hearsay. To maintain that the "rules of the road" may rightfully be strictly enforced under such conditions, as some automobilists have done in order to exonerate themselves from blame for an accident, can only be evidence of a brutality, which society cannot wish to countenance. Automobile traffic regulations which, to those whose lives are conducted on a legal rather than a moral basis, seem to dispense a license for such brutality by giving precise and narrow definitions of rights and duties, would not be likely to be upheld in the higher courts.

If it has been clearly shown in the foregoing that the speed possibilities of automobiles form only one among many new factors affecting the safety of traffic, and that the dangers due to this one factor are not proportioned to the numerical figures by which speed may be designated in each instance, but largely by other conditions of a complicated and variable nature, those seriously interested in the problem may be prepared to admit that speed restriction alone is an inadequate measure for relief, and one singularly unadapted for enforcement by legal means. On the other hand the speed question is one on which public opinion expresses itself most forcibly. It will solve itself in short order when the responsibility for automobile accidents is brought home in each case by prompt judicial consideration of all the circumstances attending them. Statutory law may be required to fix the principle of responsibility, but the anticipatory wording of a statute can never hope to cover the variation in conditions which may arise in automobilism, of which we have seen only a comparatively insignificant and fashion ridden beginning. To measure this variation in conditions with justice and equity only one instrument is sufficiently pliable and versatile—the human mind, the human conscience. To bring the human conscience to bear upon each case when the safety of traffic has been violated, and to give publicity to its findings and force to its reprisals, seems to the rational method indicated for instilling the full sense of responsibility in automobilists, as well as in society in general, while at the same time leaving full liberty for unhampered development of the automobile movement. According to this the remedy for the evils, with which boards of aldermen and legislatures are wrestling in vain all over this country, should lie in conferring unquestioned jurisdiction upon magistrates to adjudicate civil as well as criminal liability in cases relating to traffic on the highways, according to their own best judgment of the circumstances in each instance, while leaving it to the automobile club, the press and public opinion to compel the magistrates to inform themselves on the subject.

When there seems to be a widespread disposition to doubt the competency and impartiality of magistrates in connection with such questions as may arise, unless they are tightly bound by strict interpretation of some special automobile statute, it may be well to remember that unwillingness to submit to the decisions of the judiciary is the beginning of anarchy, and also that the magistrates, if not fully competent at first, will soon learn the limits of their authority from appealed cases. If occasionally they should fail to appreciate the equity in a case, would they, after all, do so nearly so often as the automobilist at present fails to act with justice and consideration to the pedestrian or other elements in the traffic? So long as the magisterial decision is considered near enough to justice for the class of people usually arraigned before these tribunals, it seems brazen to refuse submission where people of a wealthier class are concerned, or, if it

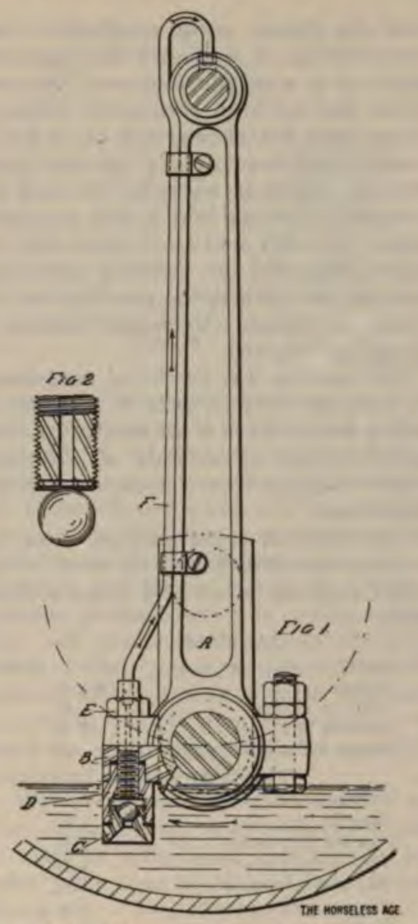
can be maintained, that magistrates are incompetent, the proper remedy would seem to lie in a reorganization of this branch of the judiciary rather than in restrictive legislation adopted to curtail our benefits from automobilism and confessedly neither just nor suitable. On the other side of the question it is difficult to discover anything more estimable than a cynical and poorly concealed arrogance declaring that the justice of magistrates is good enough for the poor, but cannot be tolerated for those of greater pretensions.

Wrist Pin Lubrication of Vertical Engines—A Positive System.

By Hugh D. Meier.

The wrist pins of all single acting motors, be they steam engines or explosion motors, require abundant lubrication. Owing to its location in the piston a wrist pin is exposed to high temperatures as long as the motor is at work and the specific pressure on the wearing surfaces of the pin and the rod bushing is very high. The writer knows of a high speed French motor in which the mean pressure per square inch on the wearing surface of the pin considerably exceeds 200 pounds during the impulse and compression strokes. The designer of the little engine provided for two holes about 3-16 inch diameter at the extreme end of the rod to admit the oil splashed up from the crank chamber. Naturally the bushings and the pins of such poorly designed motors soon wear in use. A new bushing or a new pin or both must be inserted to do away with the disagreeable and destructive knock. To attempt to build up a business on such a flimsy base is certainly poor policy. Nevertheless it has been done and the backers are no doubt reaping a harvest.

We do not wish to create the impression that a wrist pin cannot be lubricated in the way described. The system is fairly satisfactory if the orifices through which the oil reaches the pin are large enough, the lubricant is of the proper grade, the specific pressure on the pin is not too high to force out the lubricating oil, and the average speed of the motor is high enough to raise the suspended oil to a higher level than the pin may occupy, when in the neighborhood of its lowest position. The line engraving shows the crank at bottom dead centre and a suitable oil level, when the device, to be described below, is to be employed. Without the extension (shown) to one of the bolts the oil level should be a little higher than in this case, i. e., it should be up to the centre of the crank-pin approximately. Only part of the cranks, bolt heads and all of the cap of the connecting rod splash the oil. If counter weights are used they will dip in, too, and cause the air to suspend the major part of the lubricant. Flywheels inside of the crank-case may hardly be expected to assist in distributing



the oil to the wearing surfaces, as they force it to the walls of the crank-case by centrifugal action. Any crank-shaft to which counter-weights are bolted will splash at two periods of every turn as against one splash per revolution in the case of a shaft without such equipment. In a double cylinder motor (with cranks at 180°) each crank will dip and splash when its piston is down. The other piston is at the top then, and the lower portion of its cylinder is exposed to the volatilized and suspended lubricant. In cases where there is a dividing wall between the cranks this does not hold good. Then each crank and its chamber are independent. Such is the case in double cylinder valveless two-cycle internal combustion motors.

If a motor is designed in such a way, and runs at so high a speed, that practically all the oil in the crank chamber is kept suspended, the device shown in the cut is of little or no use. There must be a body of liquid into which the lower end of the rod dips. Fig. 1 shows the connecting rod assembled and some of the essential features of the device in section. A is the rod, B its cap, C the funnel, D the nut of bolt E, and F the tube. When the motor is in operation and the piston moves downward to a certain position the funnel C strikes the oil, a portion of which forces the ball check-valve from its seat and then flows into the hollow bolt E. As soon as the pressure under the ball, which was due to impact, ceases, the ball settles down on to its seat. When the rod reaches the same position another charge of oil enters the system, and forces the previous charge upward. The action resembles that of the pulsometer and the device might be termed a pump without a plunger. After a few turns of the crank have been made the copper tube F becomes filled and oil flows on to the wrist-pin. Every charge that enters the ducts forces an equal amount of oil out at the top.

In Fig. 2 the ball check-valve is shown in its highest position. The bolt E is shown in longitudinal section. To prevent the ball from closing up the passage in the bolt a groove or saw cut is milled into the lower face of the bolt. All joints must be made with special care, and the hexagons of C and D should be of ample size. It would be well to place a lead washer in the space surrounding the bolt E and between the nut D and the cap B. A copper washer between the funnel C and the nut D would also do duty. The tube F should be of copper (⅛ to 3-16 inch inside diameter), and must be brazed into the teat extending above the head of the bolt E. The metal clips, well secured to the rod, will prevent vibration. Before bending the tube must be annealed. The hole at the top of the rod, into which the tube is placed, should be at least 1-16 inch larger in bore than the outside diameter of the tube to permit the escape of air.

Some of the factors that enter into the efficiency of the device are: 1, The speed of the motor; 2, the height of the oil level in the crank case; 3, the size of the funnel C; 4, the size of the passages (bolt and tube); 5, the position of the bolt equipped with the device and the influence of the direction of motion. To the first factor it may be said that the higher the speed of a motor the greater the impact between funnel and lubricant, and the more positive the action of the device. As soon as the speed exceeds a critical point the oil is kept in rotation or suspension, and a point may be reached where no lubricant is forced into the tube. In the above the second point has been discussed. It is obvious that a large funnel C will cause more oil to enter the system than a small one. In this connection it must be said that a large funnel requires a large crank-case to prevent interference. The device as shown in Fig. 1 calls for a larger case than a rod without the device does. To factor No. 4 it can only be said that large passages offer a smaller resistance to the liquid than small ones do. For practical reasons extremes are not desirable. Fig. 1 shows the attachment fitted to the left hand bolt and an arrow pointing in that direction, indicating the direction of motion. If we assume that the rod is further back—i. e., in the position when the funnel begins to dip—it is at once clear that the direction of motion and the position of the device relatively to the rod have a proper relation to each other. If the direction of motion were reversed the other bolt on the cap would dip

and splash first; the result might be that little or no oil would reach the wrist-pin.

In an automobile engine the funnel C cannot well be given its best form. Furthermore, the passages may prove inadequate unless cleaned with gasoline or kerosene at regular intervals. It would not be prudent to rely on this device solely. By drilling a hole into the wrist-pin end of the rod at both sides of the orifice shown in Fig. 1 lubrication of the wrist-pin by splash would also be possible. Should the system described be kept in good condition, it is necessary to prevent the lubricant from forming excessive carbon deposits, which would be likely to choke up the ducts. In a gasoline engine of the inclosed type, where the lubricating oil comes in contact with hot cylinder-walls and an extremely hot piston the use of a little water in connection with the oil, merely as a cooling agent, should be advocated. This system is more reliable in a steam engine, as may be deduced from the foregoing.

LESSONS OF THE ∴ ROAD ∴

The Item of Cost.

By Harry B. Haines.

The cost of operating, storing, "feeding" and keeping in working order an automobile is a proposition of great interest to the owner and the prospective purchaser of a horseless vehicle and has not received one hundredth part of the attention that it deserves.

The ordinary man does not think of what it is costing him to glide along the country roads, and the owners of autos at the present stage of the game are largely men of means, to whom the cost of operation is not such an important item. To this particular class no further mention need be made, but to the man who wants an automobile for the work it will do, and who has no idea of opening his purse lavishly to the so called experts and repair men, cost of operation and maintenance is a vital consideration.

Off hand most men would say that automobile riding should not cost more than half a cent a mile, but the man who escapes with the payment of no greater sum than this was born under a lucky star indeed. There have been instances where 15 cents a mile is not an exorbitant figure or a wild guess at the actual expense of motoring with a machine which does not "mote" properly, but the figure which is of interest is that which represents the average cost to the man who runs his machine with some consideration of its capabilities and the work for which it was intended.

I have attempted to figure up as closely as possible what it has cost me to run 3,500 miles in my light gasoline runabout and the figures prove conclusively that automobiling is not such an expensive sport as is generally supposed. My machine has not been particularly fortunate in escaping breakdowns and has spent as much, if not more, time in the repair shop than its fellows in my town. I might incidentally mention that it was purchased lately by a lady well on in years who has since succeeded in colliding with two wagons and running the machine into the river, but despite this rough handling it is still in daily use.

My machine was purchased on January 1, 1902, and sold on June 6, 1902, during which time I drove it the number of miles stated (3,500) or at least my odometer said I did, and I have no better evidence than that.

The first cost of the machine, extras included, was $768.25, and the story of my other expenses is best told in my monthly bills.

JANUARY, 1902.		
First cost		$768.25
Storage	$12.00	
Time on repairs	4.50	
Gasoline and oil	5.20	
Repair kit and tire pump	2.50—	24.20
FEBRUARY, 1902.		
Storage	$12.00	
Gasoline and oil	4.35	
One set fibre gears	3.50	
Time putting gears in	4.50	
One new gasket	.75	
Time putting gasket in	2.50	
Soldering water radiator	.75	
Two body bolts	.50—	28.85
MARCH, 1902.		
Storage	$12.00	
Gasoline and oil	5.50	
One set fibre gears	3.50	
Time putting gears in	4.50	
Soldering water radiator (twice)	1.50	
New steering spring	4.00	
Six body bolts	1.25—	32.25
APRIL, 1902.		
Storage	$12.00	
New hose connections (radiator)	1.00	
Another set of fibre gears	3.50	
Putting gears in	4.50	
Gasoline and oil	6.00	
High speed clutch (new)	3.50	
Time putting clutch in	3.00	
Four body bolts	1.00—	34.50
MAY, 1902.		
Storage	$12.00	
Two sets of fibre gears	7.00	
Putting gears in	9.00	
One set of brass gears	6.50	
Putting gears in	6.00	
Two body bolts	.50	
Gasoline and oil	5.85	
Soldering water radiator	1.00	
Two new tires ($12.50 each)	25.00	
Six battery cells	3.50	
New wire connections	.75	
One tire vulcanized	3.00	
Four wire spokes put in	1.00—	80.60
JUNE, 1902.		
Storage	$2.40	
Gasoline and oil	1.76	
Two new spokes put in	.50	
Soldering water radiator	.75	
One new sparking plug	1.50	
One new backboard for dos a dos seat	6.00	
One body bolt	.25—	13.16
Total cost		$981.21
Selling price		650.00
Net cost of operation		$331.21

The total cost of operation does not include automobile goggles, caps, gloves or other wearing apparel, nor the thousand and one little adjustments made at the storage station, for which no charge was made. To run 3,500 miles at a cost of $331.21 would make the average cost of each mile something like .097 (9 and seven tenths of a cent), which is considerably less than the cost of keeping a good horse and buggy.

It must be taken into consideration, of course, that I secured an exceptionally high price for my second hand machine, but I can honestly say that I used the carriage as hard as it was possible for anyone to do so, running over rough or smooth roads at the same rate of speed, and I do not doubt that with an operator more careful than myself the cost would have been reduced materially.

It will be seen from the bills that my chief source of expense was new gears, body bolts and a leaky radiator. I have been told that the manufacturers of the particular make of machine I was the owner of have strengthened all these parts and done away with the repair man's profits on them. For the benefit and financial comfort of my fellow automobilists I sincerely trust that this is so.

Eleven dollars and fifty cents for fire insurance and the interest on money invested is not figured in this amount.

Storage Battery Outlook.

A cable dispatch from London, of July 10, says: At a meeting of the shareholders of the Electrical Power Storage Company today the chairman alluded to the persistent rumors about the new accumulator invented by Edison. He said he thought it was too early to place any reliance on statements which had been evidently circulated by irresponsible persons. The chairman said that the company had followed Mr. Edison's figures closely and was unable to find, even on his own statements, that he was able to make a battery more than 10 per cent. lighter than the special battery made by the Electrical Power Storage Company, and it was about two or three times more expensive in manufacture. It would have to last a long time, the chairman said, if it were to come into competition with those which the company was now selling. Judging from his own experience, the chairman said, he thought it might be found that Edison was still far from being in a position to make a commercial article of his invention.—*Electrical World and Engineer.*

The *American Machinist*, in its issue of July 10, describes a milling machine attachment, which is manufactured by Brown & Sharpe, Providence, R. I., for the production of peripheral and face cams. On page 991 of the same issue a contributor describes a simple "rig" for cutting bevel gears on the milling machine.

BEGINNERS PAGE.

Shifting Gear Variable Transmission.

Shifting gears, in connection with a conical friction clutch, are almost exclusively used by European gasoline vehicle manufacturers for varying the gear reduction from the motor shaft to the driving wheels, and are also coming more into use in this country, particularly on heavier vehicles. These gears are practically always made to give at least three forward gear ratios and one reverse; often four forward and one reverse and sometimes even five forward and one reverse. In American built machines three forward gears and one reverse is the rule.

A gear giving three forward gear ratios and one reverse is illustrated in Fig. 1. These gears are usually incased in an aluminum or cast iron box, which supports the bearings for the shafts, and the box is shown in the drawing.

Referring to Fig. 1, A is the clutch shaft or pinion shaft. The part of this shaft extending beyond the casing at the right is square sectioned, and this part slides the cone of the conical friction clutch (not shown) by which shaft A is clutched to the engine crank shaft. On shaft A within the case are keyed four pinions, 1, 2, 3 and R, the two outer of these pinions being located close to the bearings and the other two each a suitable distance inward. The shaft B is square sectioned for its entire length between bearings, and on this square portion of the shaft slides a set of three gears, 1, 2 and 3, which form one solid piece. Between the gears 1 and 2 a circular groove is cut, into which engages the forked lever C, by means of which the gears are shifted.

Both the shafts A and B have one of their bearings in a partition wall of the casing. The shaft B projects from the bearing in this partition and carries at its end a bevel pinion D in mesh with a bevel gear D' on the transverse countershaft or differential shaft E. This shaft, which is of course in two parts, also has bearings in the casing and carries in addition to the bevel wheel D' the differential gear F.

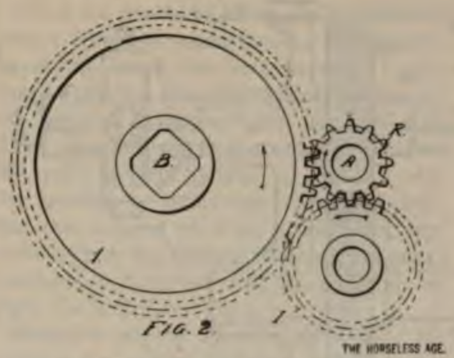


FIG. 2

Below the pinion R will be observed another pinion I, which is of larger diameter and has more than twice the width of face that pinion R has. These two pinions are constantly in mesh and serve to reverse the direction of motion or to back the vehicle up, as will be more fully explained further on.

We will assume that gear wheel 1 has four times as many teeth as pinion 1; gear 2 twice as many teeth as pinion 2, and gear 3 the same number of teeth as pinion 3.

In the drawing pinion and gear 1 are shown in mesh and the vehicle is then running on the lowest forward gear or the "first" gear, as it is commonly called. Shaft B revolves at one-fourth the speed of shaft A and the motor shaft. The vehicle then necessarily travels slowly and has much tractive force and this gear is therefore always used for steep hills.

Now let the set of sliding gears be shifted to the right by means of the forked lever C, a hand lever under the driver's control and intermediary connections. To effect this motion the friction clutch must first be "thrown out," because when power is transmitted by the gear and pinion the friction at their tooth surfaces prevents the gear being shifted, which, moreover, is a very fortunate feature.

As the gears are shifted to the right the gear and pinion 1 come out of mesh, and as the motion continues the gear and pinion 2 are brought into mesh. That they may be brought into mesh sideways the teeth of both are filed down or beveled at the end. When the gear has been brought to a position of perfect mesh with the pinion the friction clutch is thrown in again and the vehicle now runs on the second or intermediate gear. The shaft B rotates once for every two revolutions of shaft A, and for a given engine speed the vehicle travels twice as fast as when gear and pinion 1 were in mesh.

If a still higher speed is desired the shifting gears are shifted still farther to the right, until gear and pinion 3 are in mesh; that is, to the limit of motion. The two shafts A and B then run at the same speed and the carriage is said to run on the third or highest gear.

When it is desired to reverse the direction of motion of the vehicle the shifting gears are shifted to the left from the position they are shown to occupy in the drawing. Gear 1 shortly after coming out of mesh with pinion 1 is brought into mesh with the intermediate pinion I. The latter revolves freely on a short shaft or stud supported by the gear casing and is, as already stated, continually in mesh with pinion R. The power and motion is now transmitted from shaft A to shaft B by way of pinion R, intermediate pinion I and gear 1, as is clearly shown in Fig 2. The result of the introduction of an intermediate pinion is that shaft B is rotated in the reverse direction as when a pair of gear wheels on shafts A and B respectively mesh directly with each other. When the vehicle is stopped the shifting gear is moved along the square shaft until the gear 1 occupies a position midway between pinion 1 and the intermediate pinion R. When the engine is started up, since the conical clutch is normally in engagement, shaft A will rotate, but shaft B will remain stationary. The operator then disengages or "throws out" the clutch by means of the clutch pedal and shifts the sliding gear so gear and pinion 1 come into mesh. Then he releases the pressure on the pedal, the clutch grips and the vehicle starts off on the low gear. It will be noticed that with this construction all the forward speeds, as well as the reverse, may be obtained by the simple motion of a single lever.

The type of gear here illustrated is suitable for light carriages. It is always preferable to shift the pinions, but since in such a small gear the smallest pinion is hardly larger than the shaft must be difficulties are met with in trying to make the pinions slidable, and the alternative of shifting the gears is resorted to.

In Fig. 3 is shown a variable transmission gear of the shifting type, in which the transmission is direct for the highest gear; that is, the driven shaft is operated from the driving shaft without the intermediary of the gears. A is the clutch shaft which

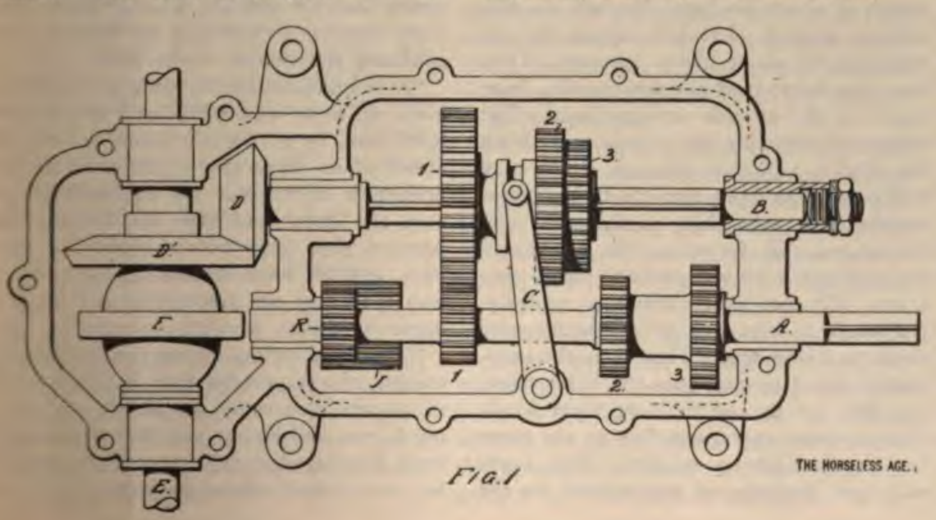


FIG. 1

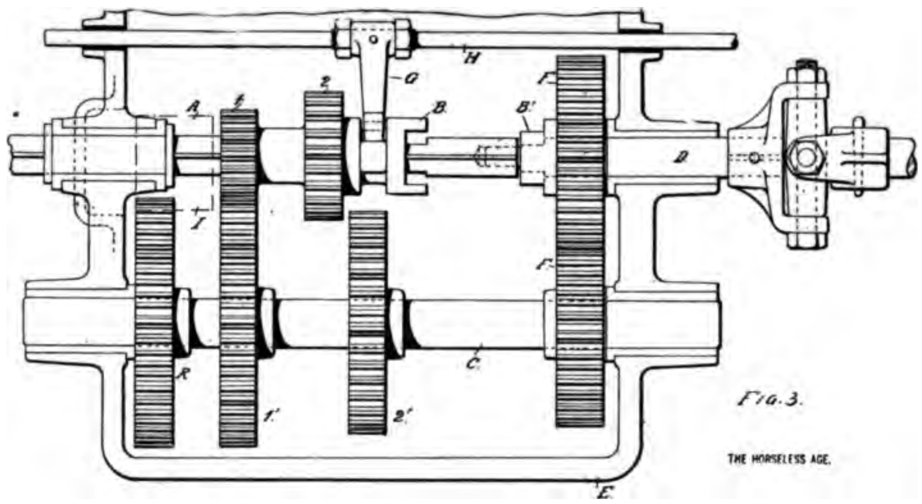


Fig. 3.

is squared at both ends to receive the cone of the clutch and the set of shifting gears. The shifting part comprises the two pinions 1 and 2 and the part B of a positive clutch. D is the driven shaft and C an intermediate shaft, all of which have bearings in the gear casing E.

The sliding part, which can be moved back and forth by means of a forked pawl G and shifting rod H, is shown in the drawing in the position of the first or slowest forward gear. Power is now transmitted from the clutch shaft A through pinion 1, gear 1 and the pair of gears F F to the driven shaft D. Since gear 1 is much larger than pinion 1, shafts C and D run much slower than shaft A.

To obtain the second speed the sliding pinions are shifted to the right to bring pinion and gear 2 in mesh. Then the power is transmitted through pinion and gear 2, shaft C and the pair of gears F F. It will be noticed that in both of these cases shafts A and D turn in the same direction. When the shifting part is moved still farther to the right the pinion and gear 2 cease to mesh and the two members B and B' of the positive clutch engage with each other and directly couple the driven shaft D to the clutch shaft A, which give the highest speed.

R is the reversing gear and I indicates a wide intermediary pinion, which is constantly in mesh with R. This intermediary pinion can be shifted in the direction of its axis and normally occupies a position farther to the left than shown, so that the pinion 1 can be shifted to the left till it is out of mesh with gear 1, without coming in mesh with pinion I. The shifting part then occupies the "stopping" position.

If it is desired to run the vehicle backward the pinion I is simply shifted to the right to the position it is shown occupying, when it will mesh with both pinion 1 and gear R. A special lever is therefore required to reverse with this arrangement.

The device just described is intended for chainless transmission, or shaft transmission, and a universal joint J is shown at the end of the driven shaft D.

There is quite a variety of designs of shifting gear transmission devices, but the two systems illustrated are representative and embody the general principle. The differences reside mainly in the operating mechanism.

How to Break Horses to the Automobile.

In the circular on breaking horses to the automobile which the Automobile Club of America is distributing, the following method is recommended:

"Select a place, preferably a small square in your town where the road is wide, or a mile of wide road where there are no ditches, if possible. Have the horse or horses to be trained driven five or six miles sharply before the lesson begins. A well fed animal just taken from the stable is apt to feel so good that he will cut up on the least provocation.

"The horse to be trained, if possible, should be harnessed alongside of a horse that is accustomed to automobiles. If this cannot be done he should be driven. It has not been found satisfactory to lead or ride a horse in breaking him in to an automobile. Under these circumstances he is too free and too little subject to control.

FIRST LESSON.

"Send the automobile around this square or along the road at about 6 miles an hour. Have the horse which is to be trained follow the automobile at a distance of about 10 feet. He will do this without protest. Let him follow the automobile for about fifteen minutes. Then have the horse pass the automobile, leaving it on the off side or right hand. The horse will probably shy a little away from the vehicle. Do not attempt, if the road will permit, to hold him up to the automobile or to whip him on the near side, but let him shy. As soon as he has passed the automobile he will probably break into a run. Do not check him too suddenly, but speak to him, and he will soon come down to a slow trot. Then have the automobile speed up and pass the horse, leaving him on the off side or right hand. Repeat these operations five or six times for another fifteen minutes. The horse will have become so accustomed to the automobile that he will no longer shy and no longer try to run in passing it. A horse is really a very nervous animal and his lessons should not be too long; thirty minutes is enough for the first day.

SECOND LESSON.

"The first morning's proceedings should be repeated for, say ten minutes. Then the automobile should be stopped at the side of the road and the horse should be turned around so as to face it. The engine of the automobile, if it is a gas engine, should be slowly rotated. The horse will shy a little. He should repeatedly pass the automobile while stopped in this manner for say ten minutes. Then the automobile should be set in motion slowly and he should pass it for ten minutes more, after which he should be sent to the stable. It will be found that he has gained considerable confidence and that he will shy but little. The occupant of the automobile should call out to the horse when he is passing, in a loud voice, 'whoa, boy.'

THIRD LESSON.

"The third morning he should be taken out and made to repeat or review all that he has learned on the first and second mornings, which should occupy fifteen minutes. It will be found that he will probably not shy at all, and the automobile may be speeded up and he may be passed when facing it at a considerable speed. The horn should be blown gently at first and later on vigorously. The occupant of the automobile should call out to the horse when passing, in a loud voice, 'whoa, boy.'

"It will be found if these instructions are carefully carried out, that there are but few horses that cannot be made to pass an automobile at a high rate of speed with safety in three lessons of thirty minutes duration each.

"The point we particularly desire to impress upon you is to always let a horse shy in passing an automobile, if the road will permit. There are occasions where the road is so narrow, and the ditch so abrupt, that not only a horse must be kept up to the automobile but he must be struck smartly with the whip to keep him from turning around and to prevent his capsizing the vehicle in the ditch.

"It is quite useless to whip and spur a horse up to an automobile and to try and force him, by giving him pain, not to be afraid of it. It is also a bad practice, in driving a horse past an automobile, to stop the horse and have the automobile proceed past him. He is frightened and very apt to turn around. The proper way is to stop the automobile and let the horse be driven past it.

"We desire to impress on you and on all owners of automobiles that, if the drivers of automobiles would go slowly in passing horses and if they saw that the horses were frightened, would stop, there would be no accidents caused by horses."

...COMMUNICATIONS...

Explosive Motor Queries.

NEW YORK, July 15.

Editor HORSELESS AGE:

(1) Would a 5¼x6½ inch gasoline engine make more turns than a 5x7 inch, providing the compression was the same? If so, how much?

(2) Also, what increase in horse power would you get?

(3) What would you consider the proper speed for an engine of such dimensions, 5¼x6½ inches? Also, would not the vibration be less in a 5¼x6½ at 800 revolutions per minute than in a 5x7 inches at 600 per minute?

(4) Would you consider the bore too large for the stroke? If so, why?

By answering the above, you will greatly oblige, Yours very truly,

E. R. F.

[The compression does not affect the speed of a motor, provided that the flywheel is heavy enough to carry the piston over the compression at a constant angular velocity. If a light flywheel is employed it must make more turns than a heavy wheel would, the momentum being the same. The 5¼x6½ inch engine must run at a slightly higher speed than the 5x7 inch motor, the piston velocity being the same. Engines of the high speed type run at the rate of 800 to 900 feet piston speed per minute. In America this is not considered good practice, where a rate of 650 feet is regarded as a good average.

The 5¼x6½ inch motor, if well proportioned and carefully built, ought to develop about 8½ horse power at 700 revolutions per minute. That is all that can be expected of the 5x7, as well. If motors representing the two sizes are well balanced neither will vibrate more than the other. The stroke volume of the former is a little greater than that of the latter, and since the maximum number of turns of the 5¼x6½ exceed those of the 5x7, it should prove to be slightly more powerful than the latter. However, the connecting rod, crank shaft and frame of the 5¼x6½ would have to be slightly heavier because of the greater piston area. A bore of 5 inches and a stroke of 7 inches have been accepted as standards by a number of makers. The relation of bore to stroke is good in both types.—ED.]

To the Committee of Fifty.

NEW YORK, July 15.

Editor HORSELESS AGE:

Seeing that Horace E. Parker is apparently a reader of your paper, I would like to ask him whether he or his learned friends of the committee of fifty have ever taken the trouble to find out what a speed of 8 miles an hour means?

They are probably all in the position of people living in glass houses, and should be careful about throwing stones. I will venture to say that they are all lawbreakers, and that every time they are driven in their carriages about the city they exceed the speed allowed by law. If they will take the trouble to time themselves they will find that a speed of 12 miles an hour, say, in driving to the theatre, is about the usual rate at which parties are being driven in New York city.

Reckless driving by everyone should be stopped by severe penalties, but, on the other hand, a law limiting the speed to 8 miles per hour, excepting in the most congested districts, is absurd. It is not regarded by horse drivers, nor ever enforced against them, then why should automobilists be held down to such a slow speed?

A speed of 12 miles an hour on uptown streets is not too fast, while no sensible driver would think of going over 8 miles in a crowded street. In outlying districts, as between the villages of Greater New York, a speed of 15 or even 20 miles an hour might be allowed.

You are right in asserting that the law should be strictly enforced, but it should be right to start with.

As to examining and licensing drivers, that is right and proper, but drivers of all vehicles should be included.

HENRY W. STRUSS.

Driving Test in New York City and Braking Test on Long Island.

On July 16, under the direction of Smith & Mabley, three Panhards, including a 12 horse power 'bus, were operated through Fifth avenue, Broadway and many down town busy streets, followed by a run and brake test on Long Island, for the purpose of showing the city law makers the ease with which automobiles may be steered and stopped. Among the passengers were Alderman Oatman, the sponsor of the proposed more liberal speed ordinance; Armitage Mathews, chairman of the aldermanic law committee, and other public officials.

The brake test, which was held at Williston, L. I., resulted as follows:

A 12 horse power machine, traveling at 30 miles an hour, was stopped twice in 95 feet, and at 20 miles an hour was stopped in 31 feet 9 inches. An 8 horse power machine traveling at 40 miles an hour was stopped in 91 feet 9 inches.

Mr. Mathews, in a subsequent interview with a HORSELESS AGE representative, said he had been considerably impressed by the facility with which the drivers controlled the movement of the vehicles in the crowded city streets. The experience confirmed him in the opinion that the present 8 mile minimum speed is unnecessarily low. He specially favors an increased speed in the outlying districts, believing that the majority of automobilists can be relied upon to use discretion and consideration in the operation of their machines. He regards it as a hardship to impose undue restrictions upon all users because a few have shown themselves reckless in their disregard of the rights of others.

Brighton Beach Novelties.

Among the events which appear on the program of the Long Island Automobile Club's Brighton Beach races, to be held August 23, is an "Australian pursuit race," a new feature in automobile races, an obstacle race and a 25 mile lap race, each lap to be for the record for the corresponding distance.

The pursuit race will be a sprint from the crack of the starter's pistol until there remains but one unpassed car on the track. The conditions require that as soon as a car is overtaken and passed it must drop out, and at the earliest opportunity withdraw from the track. Given four or five cars of approximately equal speed and weight the personal equation in jockeying the turns and manœuvring to pass competitors should furnish a stirring spectacle. As there can be but one winner but one prize is hung up.

While the exact length of the course for the obstacle race has not been determined, it can be stated that the start and finish will be immediately in front of the grandstand, clubhouse and paddock.

In order that there may be no time lost by the contestants in the 25 mile lap race and as an additional incentive to "hustle from the word go" an award of $5 will be made to the winner of each lap. This is in addition to a cup or purse of $100 to the winner and a cup or purse of $50 to the second.

Accidental Starting.

Two accidents of similar character are reported this month from the antipodes of the country, New York on the one hand and Oakland, Cal., on the other.

At New York city a gasoline automobile belonging to Dr. Bernard Frankel, of 74 Rivington street, was left standing in front of the doctor's house while his chauffeur crept underneath to adjust some part of the machinery. A mischievous boy pulled the lever and the machine ran down the street, running over four boys and colliding with various obstacles until it was brought to a standstill by a policeman, comparatively little damaged by its rough experience.

At Oakland another doctor left his auto standing in front of his house and in some manner unexplained the machine started off down the street, to be finally brought under control by a policeman.

Press dispatches from Kenosha, Wis., state that the redoubtable Pennington, whose name is infamous to the automobile trade of two continents, is endeavoring to interest local capitalists in the manufacture of an automobile which he claims to have invented.

MINOR MENTION

A carload of steam carriages was recently shipped to Tucson, Ariz.

The Standard Welding Company, Cleveland, Ohio, are erecting a building 60x130.

Gray & Davis, lamp manufacturers, Amesbury, Mass., are building a new factory.

The Meadow Club, Southampton, L. I., has decided to bar automobiles of all kinds from its grounds this season.

W. M. Gage, of the United States Hotel, Saratoga, N. Y., has designed a steam tonneau, which he will manufacture there.

The police along the North Shore above Chicago are still pursuing the scorchers. Three more arrests were made on Sunday, July 13.

B. H. Pomeroy, J. L. Lazell and C. D. Winfield have incorporated the Pomeroy Motor Vehicle Company, of Brooklyn, N. Y. Capital, $120,000.

Wednesday, September 17, has been chosen by the racing committee of the Cleveland Automobile Club for their first annual local motor race meet.

The board of governors of the Rhode Island Automobile Club at a meeting held last Wednesday week decided to hold a race meeting at Narragansett Park next September.

The Dow Portable Electric Company, 218 Tremont street, Boston, Mass., are now manufacturing a spark coil which can be attached to the dashboard, where it is easy of access.

The Marlboro Automobile and Carriage Company, Marlboro, Mass., have accumulated a stock of steam carriages, and are reported to have temporarily shut down their automobile department.

The Golden State Automobile Company, San Jose, Cal., successors to the Christman Motor Carriage Company, will do a general supply and repair business in connection with the manufacture of the Lupton transmission.

The managers of the Chicago 100 mile endurance run report that the postponement of the event has swelled the number of entries to nearly forty. Many members of the club who have received their machines within the past two or three weeks will now be able to enter.

The Kansas City Automobile Club was formally organized recently at the Hotel Baltimore. Louis Curtiss was elected president, Ferd Heim vice president, C. F. Lovejoy treasurer and Myron C. Albertson secretary. Twenty-three members were admitted, including W. E. Roby, of Chicago, and Winkfield Denton, of Leavenworth. Arrangements were completed for the 100 mile endurance contest, to be held July 18. There are already twelve entries, with a prospect of six or eight more. H. W. Loose was elected captain of the run.

The Bronx Automobile Club, which has just had its first run, now has fourteen members. Dr. J. G. Sauer is president, Dr. A. C. Geyser vice president, and Dr. F. M. Jeffries secretary and treasurer.

Russell A. and Fred M. Alger, Jr., Detroit, Mich., sons of the former Secretary of War, are having an automobile made after their own designs and if it proves to be the success hoped for it is reported that they will engage in the manufacture of it.

The Christman Motor Carriage Company, San Jose, Cal., have sold their factory to the Golden State Automobile Company, and will in future devote their entire attention to the introduction of the patent "Christman silent muffler."

W. C. Leiber & Co., 71 Nassau street, New York, are offering to the automobile trade a new acetylene lamp called the Sunbeam, which, it is stated, will not jar or blow out. The dimensions are 8x8 inches and the weight is 5 pounds.

Paul Picard, a member of the Chicago Automobile Club, who has figured frequently in the daily press of the Western metropolis as a defier of the city speed law, has resigned from the club in high dudgeon because of adverse criticism.

The Winton Motor Carriage Company will be established in their new factory in West Cleveland by the middle of September. Much new machinery has been purchased and every effort is being made to equip a model factory.

A special from Beeville, Tex., announces the arrival at that place of the first automobile seen in that section, a steam machine purchased by the Rev. Father Donado, of Refugio, to be used in making his periodical trips to the railway stations, the nearest of which is 32 miles from Refugio.

Max Fleischmann, Jr., who started from Cincinnati a few days ago with the intention of making a record breaking trip to New York on his automobile, reached Wheeling, W. Va., Wednesday night in tow of a farmer's team. He found the roads in a terrible condition, owing to recent heavy rains.

N. J. Cassidy, manager of the Chicago branch of the Automobile and Cycle Parts Company, has been summoned to answer to a charge of contempt of court because he discharged one of his employees, a tool maker, who was summoned as a witness in a case and was kept in court away from his work for five days.

The board of governors of the Automobile Club of America will hold a meeting this week to decide upon a date for the New York-Boston endurance run. October seems to be the favored month in order to avoid the September equinoctial, which played sad havoc with the New York-Buffalo run last year.

An automobile show is being projected at San Francisco for next winter.

A. E. Booker Ridley, San Francisco, Cal., has taken the local agency for the Electric Vehicle Company.

The Avery Stamping Company, Cleveland, Ohio, is furnishing tanks and other sheet metal containers for automobiles.

The Mobile Company of America is opening a branch store in the Lennox apartment house, Colorado Springs, Col.

The N. A. A. M. has protested against the ruling of the Interior Department excluding automobiles from the Yellowstone Park.

The International Motor Car Company expect to turn out about twenty of their new gasoline touring cars by the end of the month.

It is reported that L. C. Taylor, of New Concord, Ohio, will engage in the manufacture of gasoline engines for automobiles and launches.

C. W. Kelsey, Chestnut Hill, Philadelphia, advertises himself as an automobile expert, giving advice to prospective purchasers for a nominal fee.

The Seely Manufacturing Company recently held a formal opening of its elegant new automobile emporium at Baum and Beatty streets, Pittsburg.

The Merchants' Mobile Delivery Company, capital $50,000, and the Colorado Mobile Company, capital $60,000, have been organized at Denver, Col., by the same parties.

Frank G. Neiner and W. T. Wallace, traveling salesmen, passed through Seattle the other day in an automobile, by means of which they are covering their territory on the Pacific Coast.

The National Automobile Company, whose removal from Rapid City, S. Dak., to Oshkosh, Wis., was recently reported in our columns, is said to be erecting a large factory there under the supervision of Dr. H. H. Muggley, formerly of Rapid City.

The committee of safety of Brookhaven Township, L. I., marked the beginning of its crusade against reckless driving of automobiles by making two arrests Saturday, one offender, a New Yorker, being fined $25 and the other, a Providence chauffeur, who acknowledged his error, being fined $10.

A joint meeting of a committee of the board of freeholders and the board of works, Newark, N. J., was recently called to formulate an ordinance to regulate the speed of automobiles and steam vehicles, and also the weight steam trucks shall be allowed to carry. The board of works and the board of freeholders have been legally advised that they have power to enact an ordinance to regulate the speed of any vehicle in the streets of the city and on the county avenues. A limit of 10 miles an hour is recommended in the city,

except at crossings, where 5 miles is regarded as the safe speed.

The Krastin Automobile Company, of Clark avenue, Cleveland, have about completed their tonneau touring wagon.

The first American Panhard model made at the Rome, N. Y., factory has arrived at the depot of Smith & Mabley, in New York.

The Berge Automobile Company has been incorporated under New Jersey laws with $40,000 capital by J. C. Hayes, of Camden, and John Wiley and Augustus Treadwell, of New York.

The Eastman Metallic Body Company, of Kinsman street, Cleveland, have outgrown their present quarters and are now arranging for more room. A number of stamping machines and other tools will be installed.

E. T. Birdsall has been engaged by the Trenton Iron Company, Trenton, N. J., to take charge of their automobile department. This company expects to have a series of high class four cylinder pleasure carriages and delivery wagons ready for 1903.

The Calumet Tire Rubber Company, Chicago, Ill., have delivered a set of 7 inch solid rubber tires to the Fischer Motor Vehicle Company, Hoboken, N. J. Over 600 pounds of rubber entered into these tires, which are believed to be the largest of their kind in the world.

Charles B. Shanks, advertising manager of the Winton Motor Carriage Company, Cleveland, Ohio, will take the management of a new storage and repair depot which is to be opened in that city with 20,000 square feet of floor space. He will also retain his position with the Winton Company.

The R. & W. Jenkinson Company, cigar manufacturers, of Cleveland, have recently placed an order with the Cleveland Automobile and Supply Company, No. 146 Prospect street, Cleveland, for a second Waverley electric automobile. The city salesman has used constantly, for over a year and one-half, one of these machines.

The Willard Storage Battery Company, of Wood street, Cleveland, are about ready to put on the market an improved Willard battery for automobile use. The weight of the original battery has been reduced over 30 per cent. and the possibility of short circuiting is said to be eliminated. A complete description of the battery and its process of construction will be given at a later date.

The Peerless Manufacturing Company are getting out a new model which will be ready for the market in about four weeks. Mr. Mooers, superintendent of the company, has hit upon an idea for making long touring trips less irksome by installing a small refrigerator under the back seat of his touring car. Sufficient ice can be carried to keep lunches and other things cool for ten hours or more.

Doctors in Conflict with the Speed Law.

At Buffalo, N. Y., feeling among automobilists is running high in consequence of the arrest of three doctors who were speeding up their automobiles on hurry calls, as they explained to the magistrates. The president of the Buffalo Automobile Club, himself a physician, contended with the chief of police that members of his profession should be accorded this privilege when serious cases were waiting them, but the chief of police was obdurate, saying "the result would be that we would have a lot of doctors racing around town in automobiles and killing more people than they saved."

Auto Accidents.

Last week a party of automobilists near Hot Springs, Ark., met with an accident very similar to that described by Walter K. Shaw in our last issue. The steam gave out near the top of a hill, the brake failed to hold and the machine dashed down the hill into a ravine by the roadside. Two of the occupants were seriously injured.

T. A. Quinlan, Jr., was the victim of a curious accident at La Porte, Ind., last week. The Chicago dailies state that while he was adjusting some part of the carriage he knocked out the plug of the gasoline tank and received a charge of the pungent vapor or liquid directly in his eye, seriously impairing if not destroying the sight.

Steam Vehicle Company of America.

The trustee in the bankruptcy proceedings of the Steam Vehicle Company of America, Reading and New York, has presented a report to the referee, recommending the operation of the plant for the purpose of completing carriages on hand and asking permission of creditors to raise money for this purpose. Attached to the report are estimates of the costs thereof and the probable advantage to the estate of the operation. The report will be submitted to the meeting of creditors to be held July 30, 1902, at 1:30 o'clock, at the office of Christian H. Ruhl, No. 534 Washington street, Reading, Pa.

The Baker Motor Vehicle Company have been recently interviewed regarding the disposition of their racing machine, which was wrecked in the Long Island races some time ago. They are rapidly putting the machine into its exact original condition and are confident that it is perfect in all its details, and that they will soon be able to demonstrate the fact at future race meets.

Several automobiles have penetrated into the very heart of the Adirondack region, around Lake Placid and Saranac Lake, causing a number of runaways but faring well on the rough mountain roads. Lack of repair facilities, however, is a serious obstacle at present.

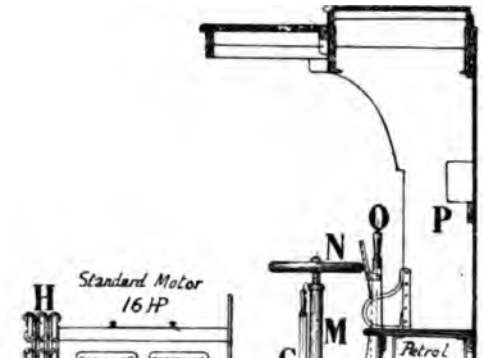
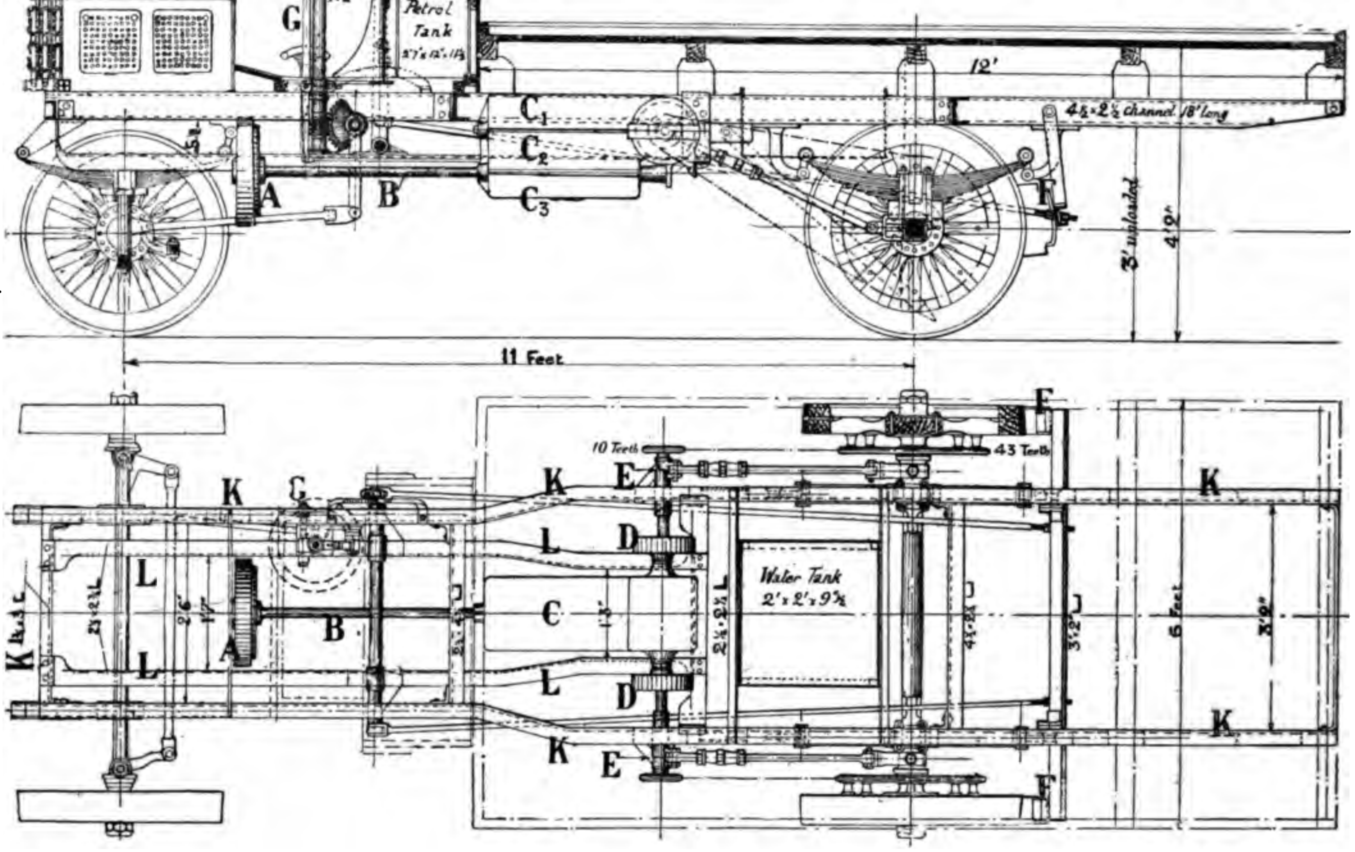
...OUR... FOREIGN EXCHANGES

The Napier Gasoline Truck.

We are indebted to the *Automotor Journal* for the line cuts and data in connection with this heavy goods vehicle, which is one of the latest productions of the Motor Power Company, Limited, 14 Regent street, London, England. Our contemporary states that with the exception of the Milnes Company, who are the builders of the Daimler system of gasoline lorries in England, and the above concern there is no manufacturer of prominence in that country who has put trucks propelled by explosive motors on the market.

The main frame K is built up of channel steel and is braced with cross members, which render it extremely rigid. The shape of this frame is clearly shown in the plan and its cross sections in the side and front elevations. An underframe L for carrying the engine and change speed gear is made of angle section steel, the ends of the two main members being bent and flattened at their forward ends so as to bolt on to the front member of the main frame. These two long members are bent to approach one another more nearly at each side of the change speed gear, and their rearward ends are carried on a cross angle which forms a dropped tie, bolted to each side of the main frame. The underframe, thus constructed, is very strong, and the engine and gear box being bolted securely to it renders it even more rigid. The main frame carried by four strong semi-elliptic springs upon the axles. The front axle itself is looped in its centre to give plenty of clearance below the motor. The rear axle is straight. All four wheels are of very substantial construction and are of the artillery type. They are somewhat dished and are fitted with steel tires.

The engine, which is of the latest 16 horse power type, is carried well in front beneath a suitable bonnet, forward of the dashboard. The four cylinders have a bore of 4 inches and a stroke of 6 inches. The crank chamber and the water jacket for all four cylinders are made of aluminum and are in two pieces. The upper portion of the crank chamber is in one casting with the jackets, and each of the cast iron cylinder liners is forced into place in it. The heads for each pair of cylinders are cast separately, these being independently water jacketed and having a flat ground joint between them and the liners. The circulating water, after passing through the cylinder jacket, is led through each of the cylinder heads in turn. Six bolts connect the iron cylinder heads to the bottom half of the crank chamber, these relieving the intermediate aluminum casting of the greater part of its tension strain. Both electric and tube ignition are fitted, the plug for the former being arranged between the inlet and exhaust valves of each

THE NAPIER PETROL LORRY.

cylinder head, and the tubes being placed on the opposite side of the heads to the valves. The cam shaft is inclosed in the crank chamber and it projects forward through the casing to carry the commutator, which is itself inclosed within a brass cover. The crank shaft lies at right angles to the front axle, and thus the commutator is extremely accessible. The centrifugal governor is mounted on the forward end of the crank shaft, between the starting handle and the crank chamber. It operates a Napier balanced throttle valve on the left hand side of the engine, and a relief spring is inserted in the rods connecting it with this valve.

A large cone clutch of the usual form is fitted to the flywheel A, and from this a rigid shaft B passes through the change speed gear box. The spring which normally engages the cone clutch is mounted on the rear end of this shaft, and is so fitted that its strength can be adjusted when desired. The fork which disengages the clutch is also placed at this end of the gear box. The change gear itself is inclosed in an aluminum case, and this is in general respects similar to the standard Napier pattern, except that it has been modified in some details. The box itself is constructed in three separate pieces, C^1, C^2 and C^3, these being bolted together by long bolts passing through lugs in C^1 and C^3, in addition to short bolts near the bearings at each end. The upper surface of the casting C^1 has a large opening for the inspection of the gear wheels at any time. A sliding sheet of steel, which is tapered throughout its length, forms a readily removable lid for this. The lid slides in grooves formed in the casting, and is held in position by a single stud, which normally prevents it from being moved. By making this sheet tapered it is only necessary to slide it along a short distance, when it can be lifted away entirely. The gear box is cast with four brackets, which rest upon the underframe L, and which are bolted to it. The first motion shaft B carries the sliding sleeve, to which are fixed the driving spur wheels. The rod which brings either of these gear wheels into mesh with its corresponding wheel upon the upper second motion shaft is mounted parallel with the first motion shaft in the same horizontal plane. The connection between the change speed lever G and this sliding rod is of the simplest character, having but two joints. Four forward speeds and one reverse are provided, any of these being consecutively brought into play by the sliding sleeve. An intermediate spur wheel is mounted upon a fixed pin in the box for producing the reverse motion. The second motion shaft drives the countershaft by means of bevel gearing through a differential gear in much the usual manner. A roller bearing is used near the bevel wheel on the second motion shaft, but otherwise all the bearings are plain. The thrust of the bevels is taken by hardened steel faces. The end pieces of the countershaft are carried in long and substantial bearings E, which are bolted to the main frame; flexible couplings are used for connecting these with those portions of the countershaft which project from the differential gear. Adjustable distance rods connect the bearings E with the rear axle, and 2 inch pitch Brampton roller chains are used to transmit the power from the countershaft to each rear wheel.

Two water cooled brake drums D are fitted to the outer sleeve of the differential gear, one of these being placed on each side of the aluminum gear case. These are provided with compensated brake straps and are operated by a foot pedal. The water supply for feeding the drums is taken by a small branch pipe from the main circulating system just above the head of the cylinder, the pipe leading to a cock on the left side of the dashboard. This cock is placed immediately above the funnel shaped mouth of a second pipe, which leads to the brake drums; the driver can thus feed water into these drums when required. The band brakes are so fitted that they will hold the lorry in either direction. Block brakes F are also fitted behind each driving wheel, these pressing against the steel tires. As first arranged, they were

operated by a hand lever, as is shown, but a screw action is being substituted for this. Two large sprags are fitted, one being on each side of the car; they are inter-connected and are arranged so that the driver can bring them into contact with the road when necessary.

The controlling levers are of the simplest character. In addition to the change speed lever G there is one accelerator pedal, a clutch pedal and a pedal which applies the band brakes on the countershaft, the last mentioned being also connected with the friction clutch. The quadrant in which the speed lever engages is made with a projection between the "off" position and the "reverse" position. This serves the double purpose of preventing the lever from being shaken away from the reverse position by vibration and it also forms a stop which renders it unlikely that the driver should pull the lever past the "off" position unintentionally. The steering gear is arranged on the Ackerman principle and is operated by a hand wheel N, mounted above a vertical pillar M. A worm and sector form the irreversible portion of the mechanism connecting the hand wheel wi h the road wheels.

The main petrol tank is fitted beneath the driver's seat, and the flow from it to the carburetor is by gravity. A separate small tank P, fixed in the hood, is used for feeding the lamps heating the ignition tubes. The water tank is carried beneath the frame immediately in front of the rear axle. The cooling water is circulated through the cylinders and through a Clarkson radiator H, in front of the bonnet, by means of a centrifugal pump, which is driven by friction off the flywheel A. The ignition coils are carried on the dashboard and are of the same compact form as those fitted to the Napier carriages. A mechanical lubricator, which is driven by a chain from the motor, is placed on the dashboard, and this feeds the necessary oil to the engine bearings. This lubricator is also fitted with an auxiliary hand pump. For lubricating the bearings of the change speed gear four Stauffer lubricators (grease cups) are fitted on the left hand side of the lorry beneath the platform.

The platform itself is 12 feet long by 6 feet across, and is intended to carry a load of 5 tons. The speed of this useful machine is anything up to 8 miles an hour, this being the normal speed on the top gear when the engine is running at about 800 revolutions a minute. As will be seen from the illustration, the platform is raised above the frame; this is done to suit the requirements of the particular purchaser for whom it has been built. A wooden hood covers the driver's seat. The entire machine is well designed, well built and is extremely strong. It should prove most valuable for a large number of purposes, and doubtless this company will construct a large number of similar lorries in the future.

Kerosene Number, May 28, 10 cents.

The Miesse Steam Vehicles.

The Miesse Steam Motor Syndicate, Limited, Wolverhampton, England, are the licensed manufacturers of flash boiler automobiles under the Miesse system.

The vehicles have the appearance of a French gasoline touring car. The generator, of the flash type, consists of one long coiled tube and is located under the bonnet. Paraffin is used as fuel and a pilot light is fitted to start up with. The burner is composed of numerous tubes with holes drilled into them, through which the gasified fuel passes. Before entering the burner tubes proper the fuel is heated—i. e., the supply pipe passes through the furnace.

The engine is of the single acting triple cylinder type and is equipped with a cam valve gear which actuates the valves. The latter are of the Corliss type. The exhaust valves are located below the cylinders, so that the water is drained automatically. An atmospheric condenser, condensing the steam, it is claimed enables the vehicles to cover 80 miles on one supply of water. The water tank holds 20 gallons and the fuel tank is large enough to supply the burner for a run cf 120 miles. The rear axle is stationary, each driver being driven by a separate chain from the countershaft on which the differential is mounted.

The supply of water to the burner can be regulated by hand. The fuel in the container is under air pressure at all times. An oiling device attached to the dash attends to the distribution of the lubricant.

Two sizes of cars are built, namely, a 6 horse power and a 10 horse power. The half-tone illustrates the latter.

The Automobile Club of Great Britain and Ireland, according to the latest London advices, is putting forth strenuous efforts to secure the permission of the authorities to hold the next Gordon Bennett International Cup race in England. Scott-Montagu, M. P., editor of *The Car*, has introduced a bill in Parliament turning over the regulation of the speed of automobiles to the local boards, from whom, it is hoped, permission for the great event may be secured, if the run is limited to hours of the day when traffic is lightest, but the passage of this bill is regarded as more than doubtful.

The Electric Vehicle Trials of the A. C. G. B. I.

The trials of electric vehicles organized by the Automobile Club of Great Britain and Ireland will take place during the week beginning July 25. The following routes have been selected:

Monday, July 21, London to Brighton.

Tuesday, July 22, Brighton to London.

Wednesday, July 23, London to Esher and back.

Thursday, July 24, London to Windsor and back.

Friday, July 25, special route for observations.

Saturday, July 26, London to Ascot and back.

The above routes apply to country carriages.

The route for town cars will be the route above set out for country cars for Friday, July 25. Town cars will run over this daily.

The following are among the rules governing this contest:

The trial is open to motor vehicles made in the United Kingdom and abroad. There shall be two sections, as follows: Section I —Town cars, i. e., cars built for town use. Section II—Country cars, i. e., cars built for country use. (a) Weight, with battery, not more than 1½ tons; (b) weight, with battery, more than 1½ tons.

In order to prevent excess in speeds, vehicles will not be permitted to pass certain points before the expiration of a certain period from the time of passing a previous point, plus the total time occupied by stops from all causes.

METHOD OF AWARDING MARKS.

(a) Reliability.—300 marks a day for each day excepting the fifth. One mark will be deducted from the 300 marks for reliability for every minute due to stoppages on the road other than stops for traffic, 5 marks for every stop for tire troubles, 20 marks for every mile of the course which may be unfinished.

(b) Speed.—The following are fixed as the average speeds (Section II) for country carriages: Twenty marks will be deducted for every mile per hour below the legal limit; 20 marks will be added or de-

THE MIESSE STEAM TONNEAU.

ducted for every mile per hour over or below the above averages.

(c) Design.—750 marks will be allotted for excellence of design. The following points will be taken into account by the judges: Accessibility of mechanism, batteries, motor and wearing parts, simplicity and efficiency of control, ratio of weight of passengers carried to total weight, general design and appearance, steering gear, efficiency and strength, comfort, design in relation to wear on tires, brakes—back acting and self locking, facility of removal of cells, protection of gearing, silence, illumination of recording instruments after dark, whether the suspension is such that the car may be suitably run on either pneumatic or solid tires.

(d) Special Marks for Fifth Day.—750 marks will be allotted in connection with the trials on the fifth day.

Hill climbing speed, electrical and commercial efficiency, recuperation, will be taken into account by the judges in their award.

TIRES, CHARGING FACILITIES AND PASSENGERS.

Instruments will be calibrated. During a stoppage for tire trouble, the other portions of the car must not be touched unless notice first be given to the observer and marks deducted accordingly. Two men are allowed for each car for washing or adjustment. The work may be done at night or in the morning, providing the total time does not exceed two hours.

Competing cars must be at Niagara, Westminster, not later than 10 p. m. on Saturday night, July 19. Any car which is not there by that hour may be disqualified.

The owner or his representative must attend at Niagara to meet the judges at an hour of which notice will be given.

At the conclusion of each run (except on July 21) the cars must be left at Niagara in charge of the owner or his representative, who will be responsible for seeing that the charging is properly effected. The competing cars must be left at Niagara after the run of Saturday, July 26, until the judges' examination is completed. On the night of July 21 cars running to Brighton must be driven to the Brighton charging station (or such other place as may be selected by the committee) for charging and storing under club supervision. Theodore Chambers has undertaken to make charging arrangements. On other days owners of cars may make their own arrangements for recharging en route should it be necessary, but the time actually occupied by recharging en route will be counted as a stoppage, and marks will be deducted accordingly.

All motor vehicles shall carry their full complement of passengers. The number of passengers or equivalent weight carried will be mentioned on the certificate, and will be taken into account in judging awards. Such persons shall weigh together at the rate of not less than 10½ stone per person, or the deficiency or absence of a person may be made up by ballast, but such ballast shall not be tools, parts or accessories.

Passengers must be provided with seats conveniently and with comfort, and cars shall be similar to the cars sold by makers in the ordinary way. Cars shall carry their full complement of passengers, and if extra passengers are carried for which proper seats are not provided, such passengers shall not count in favor of the car. Any alteration, temporary or otherwise, in the load or number of passengers shall be declared by the driver and noted by the observer.

AWARDS, BATTERIES AND ENTRANCE FEES.

Special Cup.—The proprietors of the *Electrical Times* give a challenge cup, value 50 guineas, for the vehicle which is adjudged to be the best in Section II (country cars). To be run for only once a year and to become the property of holder who wins it twice in succession, or three times in all.

The committee of the club will give the medals on the recommendations received from the judges' committee appointed by the Automobile Club: Section I—A gold and silver medal, as first and second prizes. Section II—Gold, silver and bronze medals. The medals will not be awarded unless recommendations are made to the effect that vehicles are worthy to receive them.

Certificates will only be given in respect of vehicles which have made an average of not less than 10 miles per hour on the total trials for country cars, and 7 miles an hour as regards town cars, after deducting loss of time in controls, by tire troubles and by compulsory stops.

The same accumulators are to be used throughout the week. A cell must not be changed unless notice in writing of the wish to change be given to the committee by the competitor, and written permission be given by the committee. The observer shall record changes of cells, and the number of marks to be deducted shall be left to the judges, but the total number shall not exceed 20 marks per cell.

The above rule applies to the change of any part of the car.

A seat must be provided on every car for the official observer.

The entry fee shall be £12 12s. Any balance existing after expenses are paid will be refunded to the entrants pro rata. All competitors pay for their current.

The Napier Racer.

The following is the description of the bevel gear driven Napier racer which appeared in the *Autocar* and a half tone engraving of which was published in our issue of July 16:

"The wheel base of the light Napier is 7 feet 7 inches and the wheel gauge 4 feet 8½ inches. Through semi-elliptical springs the frame of rectangular sectioned ash, with inner stiffening steel flitch plates and transverse members of T section, is carried on four 34 inch wheels shod with :
tires. The engine has four cylii
inch bore and 5 inch stroke, constr
accordance with the now well kno
pier practice, inasmuch as it has fc
inlet valves, separate exhaust pipes
Napier throttle governor. The sil
however, set in the front of the car
below the base of the crank chan
the right, and is of aluminum. E
haust pipe is 2¼ inches diamete
drive is conveyed through the usual
clutch to an aluminum gear box, i:
is inclosed gear giving three spe
ward and one reverse. On the to
the drive passes direct to the bev
set around the differential gear b
double universally jointed propelle
Roller bearings are fitted to the l
and ball thrust bearings to the clu
bevel gear at rear. The body, whi
aluminum, is set chiefly upon the
tank, which accommodates 35 gal
spirit. The water cooling arran
differ somewhat from those of the
ard Napier cars. The front of the
bonnet is closed with a rectangula
of Clarkson's radiators, consisting
ranges of twenty-eight vertical t
rear of which is an aluminum va
driven by a chain off the forward
ing end of the engine shaft. The
chain wheel is loose on the shaft
fitted with a clutch, which is cause
gage with its driving portion, keyed
engine shaft, when desired, by m
suitable connections and a lever set
steering standard. The fan is so a
because it is only required when th
standing still with the engine r
When moving, the fan clutch will be
out of gear. The pump and gover
also chain driven.

"Although the weight of the ca
16 cwts. 3 quarters 27 pounds, it
stripped as required to weigh by t
of the contest to 16 cwts. An exan
of the driving and running gear sh
nothing has been skimped in th
where strength is required. Indeed
impressed by the section and am
material in the steering connection
propeller shaft, universal joints, li
etc. The band brakes and drums
differential gear box and driving
are almost massive, the drums of th
being secured to the spokes just as
chain wheels of a chain driven car.

Bleriot's New Acetylene L

La France Automobile, in a recen
gives a description of this new lam
accompanying cut is an illustration
generator, which is composed of a
outer shell that fits into the rear
the lamp. This shell is filled witl
almost to the top, and contains
metal cylinder, with openings ad
water from below. The "acetyli
special carbide, fills about one-h
space above the perforated frustrum

New Bleriot Lamp.

ht be termed a grate. In the upper of the inner cylinder is a small re-acle that holds carbide. The gases erated below carry a good deal of sture with them, which causes the car- above to generate acetylene gas also. ore reaching the bent tube connected he burner the gases are strained by stos cotton to remove the moisture. ecial claims are made for the lens and reflector. The former is oval instead ircular, and the curvature of the latter been carefully calculated. There are burner tips, which are inclined in such ay that the gases issuing from them gle before complete combustion takes e.

is said that this lamp will light up the for over 600 feet, that it can be ex-uished immediately, relighted frequent-nd is perfectly safe.

Vehicles for Heavy Traffic at Liverpool.

he Hon. Arthur Stanley, M. P., vice ident of the Liverpool Self Propelled fic Association, in an article to the papers on the subject of motor on transport, gives incidentally a de-ition of the vehicles used by the Road ying Company for the conveyance of ls between Liverpool and Manchester. ays:

he wagons which the company have ed as a first rolling stock are capable rrying a load of four tons and haul-trailer load of another two tons. In y weather, or when exceptional ents have to be encountered, it is ble that no trailer will be hauled. vehicles, which may be stated to be similar in construction, are being built by the Lancashire Steam Motor Company, Limited, Leyland, near Preston, and T. Coulthard & Co., Limited, Cooper Road, Preston. They are steam propelled, having tubular boilers centrally fired with ordinary gas coke. The arrangements of the boiler and ashpan are such as to obviate a risk of damage to external objects, neither cinders nor sparks being emitted from the funnel or dropped from the ashpan, the specification of the vehicles being appproved by the Liverpool Fire Salvage Association to admit of their free circulation even in cotton sheds. The leading dimensions are: Length over all, 17 feet 6 inches; width over all, 6 feet 6 inches; height over chimney, 8 feet 6 inches; goods carrying platform, 72 square feet; water tank, capacity, 16 miles; fuel bunker capacity, 40 miles; average speed, 5 miles an hour; hill climbing power, sufficient to carry a full load, including trailer, up gradients of one in ten. The various control handles for steering, starting, reversing, and application of brakes, the main regulating lever, and the waterfeed handles, are conveniently disposed in front of the driver, and one man is able to drive the machine. The engines give 25 brake horse power at 500 revolutions per minute, and are in oiltight casings, thoroughly protected from dust, the transmission being by gear wheels with two ratios, the final drive from the transverse countershaft being by roller chains to sprockets on the rear wheels. The road wheels are stoutly built on the artillery pattern, with oak spokes, ash felloes, and weldless steel tires put on by hydraulic pressure. The tare limit, of course, prevents the use of the wagon, which will carry the largest load at the most economical rate, but there is little doubt that the machines described above will render a good account of themselves, and it is confidently hoped that in the near future the present restrictions will be removed."—*The Autocar.*

Adjustment of the De Dion Friction Clutches.

The De Dion carriages are provided with a somewhat unusual construction of friction clutch, and, as these vehicles are in use here in considerable numbers, the following instructions for adjusting these clutches will probably be found useful by some of our readers:

To begin with the 4½ horse power voiturette. On the right side of the gear box, looking at the same from the back of the vehicle, two sliding rods or racks will be seen, the upper one of which is actuated by a small pinion fixed to the chain wheel on top of the gear box. It is connected to the lower one by a bracket and ball bearing. The lower one slides in and out of the box and turns four small pinions, which expand or contract the clutches when the gears are changed. The rack on this rod is cut in the form of two coarse screw threads (one left and the other right) which meet in the middle. To prevent the rod turning, round it has two longitudinal grooves cut in it toward the outer end, one on each side. The hollow axle in which this rod slides projects from the gear case and has a collar or boss at the end. A small plug or bolt passes through a hole in this collar and the hollow axle and enters one of the grooves in the slide. (In some vehicles this plug is screwed into the boss and fixed by a lock nut, and in others it is held in position by a band of steel, which forms a spring clip around the collar.) To remove the plug take hold of the projecting end of same with a pair of pliers and draw it out, when the spring will come with it. If the spring is forced off separately it may break. To adjust the gear place the change speed lever on the steering columns, so that the clutches are free, remove the plug in collars referred to and turn the rod. If this cannot be turned by the fingers, a spanner applied to the nut at end of rod outside the ball bearing will easily turn it. In the majority of vehicles turning the top of the sleeve attached to rod toward you tightens the clutches, and away from you the reverse. A half turn is generally sufficient. Do not move the change speed handle to test adjustment until you have replaced the plug, with the flattened end resting in the groove of rod. If, when the gear is properly adjusted, the change speed handle is not central when the gear is free, this can easily be rectified. The chain which connects the wheel under the steering column with the wheel on the change speed box has two unions, one on each side. These have right and left hand threads, and by means of the same the length of either half of the chain can be lengthened or shortened, and the relative position of the change speed handle altered.

In the 8 horse power carriages the gears and method of adjustment are the same as on the voiturettes. The adjusting rack projects from the front end of the gear case, through the brake drum. The plug is held in position by a spring clip, or has a joint in it so arranged that when the top is straightened it disengages the plug from the groove in the inside rod. To tighten the clutches the rod should be turned to the right, as though screwing it into the gear case, and to the left to slacken them. In the vehicles in which a jointed plug is used, give the rod about a quarter of a turn after straightening the plug, then turn the plug back, and turn the rod until the plug is heard to fall into the groove.

Dr. H. H. Hulbert, a physician who believes in the efficacy of motor car rides in the cure of diseases and the preservation of health, is organizing motor runs from London to Bexhill. He has leased De Vere House, Marina, where he has partially established a private home for the reception of patients who may be desirous of giving his treatment a trial.

INSTANTANEOUS VIEWS TAKEN IN THE ARLBERG PASS O

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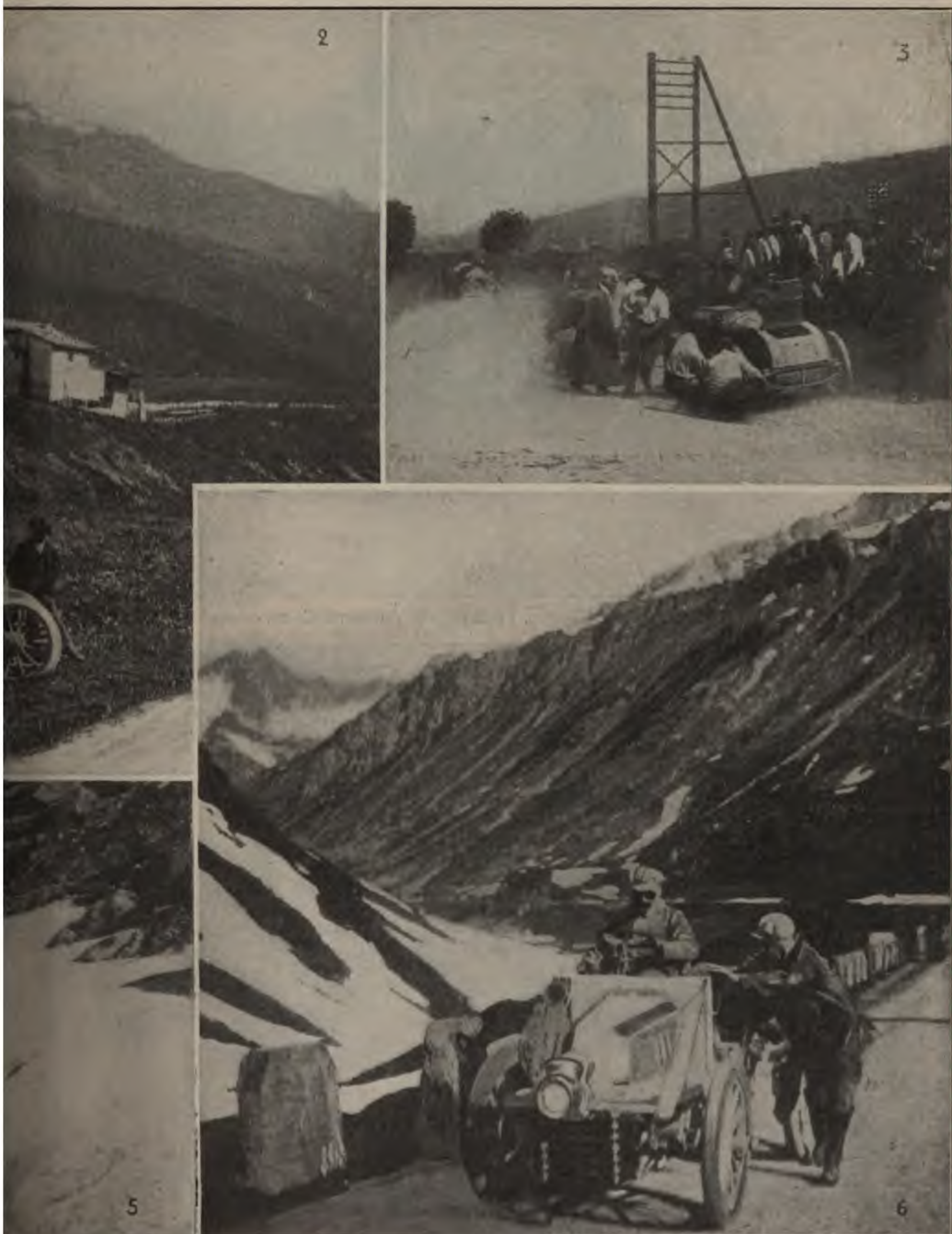


PARIS-VIENNA RACE. (From La Vie au Grand Air.)

The Darracq, First in the Voiturette Class.

Coun[illegible]ky, First in the Heavy Class (*Disqualified.*)

Gasoline Motor Ambulance.

A gasoline motor ambulance is being tested in Marseilles, France, by the authorities. The vehicle, which was designed for the work in every particular, is driven by two gasoline motors, which run independently of each other, and are rated at 6 horse power (per engine). Should one motor give out the other will drive alone. Both engines are mounted under a bonnet in front. A seat for the surgeon is provided next to the operator. The rear part of the body, which is enclosed, contains two stretchers and a seat for the nurse. There is also room for two more wounded or sick that may be able to sit up. All the seat cushions are inflated rubber bags.

Special attention has been paid to the spring suspension, only long springs being used. The pneumatics are of a practically non-puncturable type, owing to the thickness of the walls. There are three speeds forward (3.75, 7.50 and 15 miles per hour) and a reverse speed.

The vehicle has been accepted by the military authorities, and may be employed in the hospital service of the municipality soon.—*Das Fahrzeug.*

Horse Breeding in England.

Signs are everywhere apparent that the demand for high class harness horses has seen its best days, and reports of recent auction sales show that about 50 per cent. of the animals offered have been unsold. This happened on the occasion of the Brookfield stud sale, and that fate alone would be significant even if it stood alone. Royal persons have become adapts as well as enthusiasts in motoring; fashionable folk go to the opera in automobiles; society runs to Waterloo en route for Ascot by electric cabs, and the motor car is regarded as the "proper thing." Hence horse breeders will shortly turn their attention to hunters and horses for riding in preference to the high class harness horse, the demand for which seems to have sadly fallen off. But the popularity of the motor car is not wholly responsible for this state of things; increased rating and taxation have caused economies in many directions—a fact not to be overlooked by those who denounce the automobile for the changes it is causing in our national life.

The Daimler und Mercedes Gesellschaft, of Cannstadt, Germany, is evidently branching out. It was recently reported in these columns that the corporation proposes to build the Gardner-Serpollet steam vehicles in Germany. The latest advices are to the effect that the company has purchased the works of a licensee in Vienna and is about to take over the plant of its most important German competitor. The *Auto-Vélo* takes occasion to congratulate the Daimler and Serpollet interests.

Views from the Arlberg Pass on the Paris-Vienna Route.

We reproduce from *La Vie au Grand Air* a number of views showing the most perilous part of the Paris-Vienna race, the pass of Arlberg, and some of the accidents that befell the contestants there.

The first view shows the wreck of the light carriage of M. Théry, which, owing to the failure of the brakes, dashed over a precipice over 300 feet high. The operator narrowly escaped the same fate.

The second view shows the machine of M. Bellamy drawn aside for repairs at Arlberg.

In No. 3 a Darracq is shown stalled for a moment by ignition troubles while another Darracq flies by.

No. 4 shows M. Teste bowling along near Landeck, at the foot of the Arlberg mountains.

No. 5 shows the snow lined roads at the highest points on the Arlberg Pass.

"Off Again After a Slight Repair" is the title of No. 6.

PRIZES.

The list of principal prizes awarded is as follows: Marcel Renault, who was first in on his light carriage, receives the Emperor Francis Joseph's prize. Count Zborowski, who entered Vienna second, but was disqualified, receives President Loubet's prize, the first foreign motorist to reach the goal. Henry Farman wins the Prix des Dames, his brother the Prix d'Honneur for the second of the heavy cars, given by Count von Schoenborn; and Marcel Renault obtains another prize, that offered by Prince von Furstenberg, for the first in irrespective of time. Prince d'Arenberg's prize falls to the Panhard-Levassor Company. The awards offered by the Austrian archdukes have not yet been distributed.

Dust protectors are now considered essential on all up to date automobiles in England. A device mentioned in a late issue of the *Motor Car Journal* is a folding stiffener, so inserted in the rear that the top of the phaeton can be held half up, thus affording a screen for the occupants. Side curtains will add further protection.

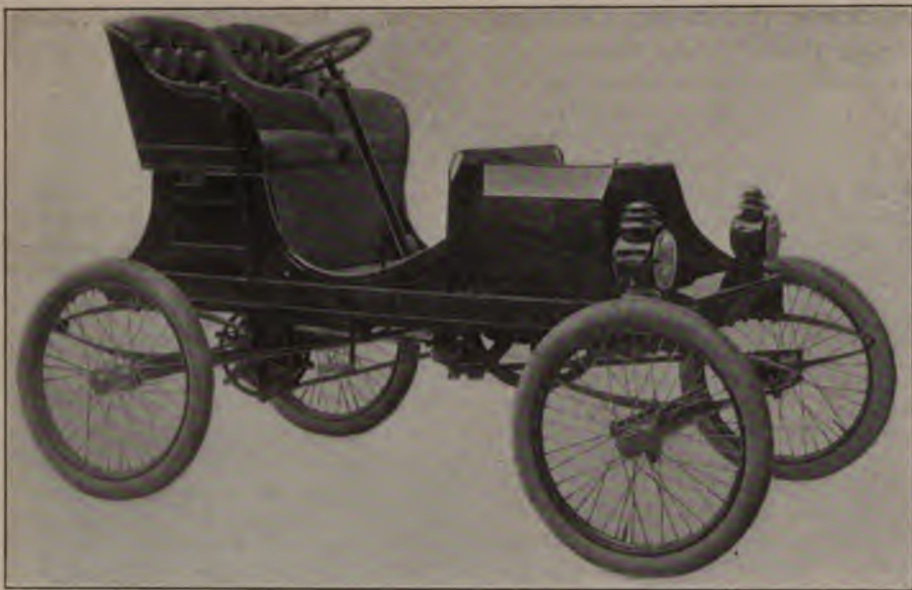
According to the *Motor Car Journal* there were more motor cars than horse equipages in Hyde Park, London, recently.

A statue of Gottlieb Daimler, the father of automobilism, has been erected at Cannstatt by the Wurtemberg Engineers' Society.

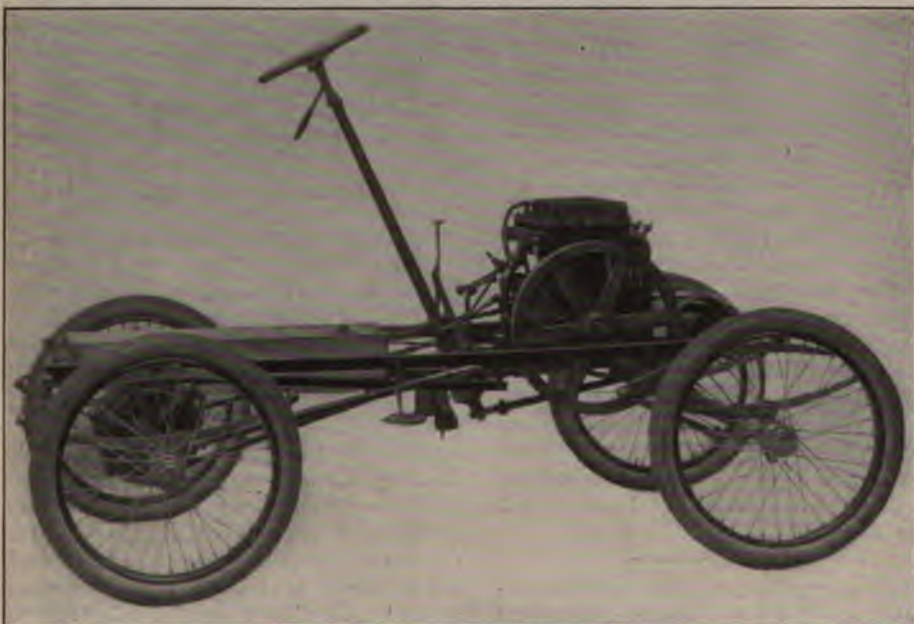
Das Fahrzeug, the official gazette of the German Association of Automobile Manufacturers, has sent circulars and inquiries to all the makers of automobiles in Germany, asking for the sizes of tires at present employed on machines of their make. The purpose is to compile the data thus obtained and seek to induce manufacturers to adopt standards. In Germany, where bad roads are the exception and touring in motor vehicles is carried on so extensively, the advantages to be derived from the introduction of standard sizes of tires are great.

D. Napier & Son, London, builders of the car which won the Gordon Bennett cup in the Paris-Vienna race, state that the car had had very few trials before it was shipped for Paris. In fact, it had only run 25 miles in all. The conditions of the race were that each car must have every part made in the country it represented. "If it had not been so," remarked Mr. Napier, "we might have built a faster car. The English coils, for example, are not so good as the French, and there are other parts in which the other country still beats us. It was only at the last moment I was able to get good English springs."

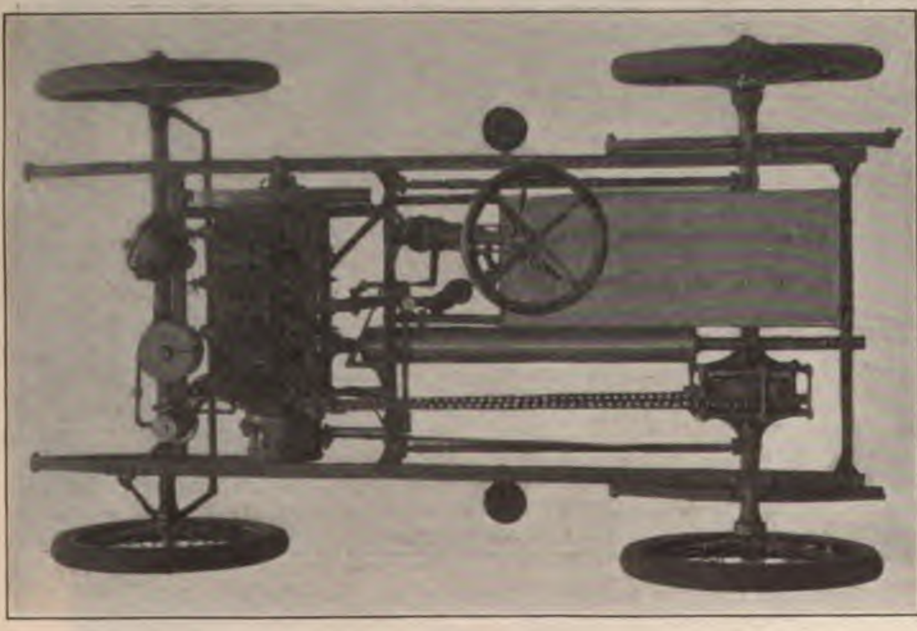
THE FOUR CYLINDER RENAULT, WINNER OF THE PARIS-VIENNA RACE.



FRANKLIN LIGHT ROADSTER.



RIGHT SIDE VIEW.



PL...

NEW VEHICLES AND PARTS.

The Franklin Light Roadster.

One of the most interesting, from the mechanical point of view, of the recent accessions to the rapidly growing list of American gasoline automobiles is the Franklin, manufactured by the H. H. Franklin Manufacturing Company, Syracuse, N. Y.

One of the novel features is the 7 horse power motor, a four cylinder, air cooled one designed by John Wilkinson, mechanical engineer of the company. The cylinders are 3¼ inch bore and the stroke of the piston is also 3¼ inches. The normal range of speed is from 300 to 1,200 revolutions, controlled by the throttle and the spark. One jump spark coil with vibrator is sufficient to ignite all four cylinders. Both dynamo and storage battery are used as the source of current. The carburetor is of the float feed variety already described in THE HORSELESS AGE.

The speed changing system is of the sun and planet type, and gives two speeds forward and a reverse, the ratio of reduction being 4 to 1 for the high speed, 12 to 1 for the slow speed and 24 to 1 for the reverse.

Two brakes are provided, a double acting band on the differential and a brake on the transmission.

The wheel base is 66 inches, the tread standard, the wheels 28 inches in diameter and the pneumatics 3 inches in diameter. Ball bearings are employed in the axles.

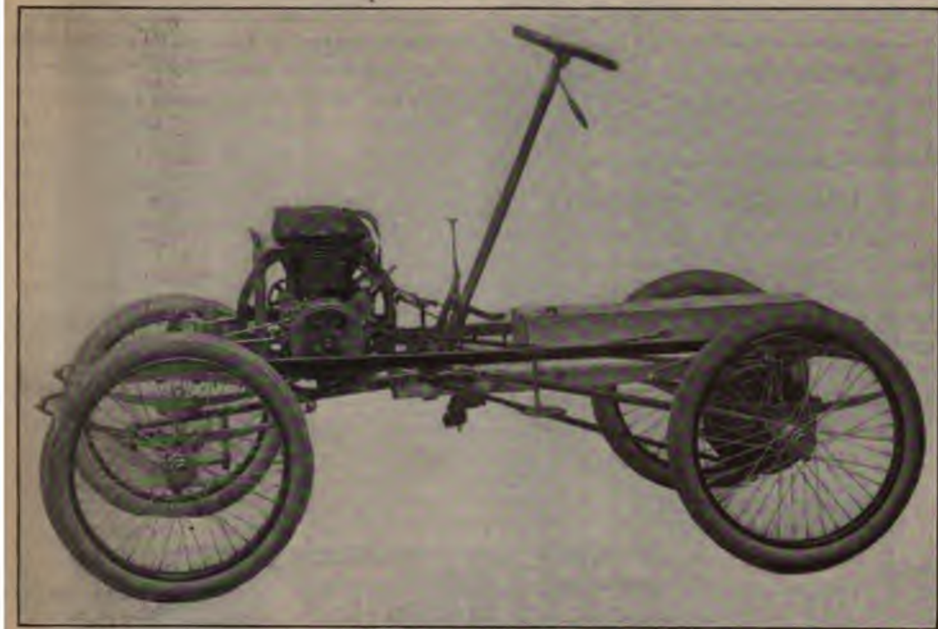
The total weight of the vehicle is about 1,000 pounds, including supplies.

The makers call special attention to the high power of the motor for the weight of the vehicle, and its moderate speed, amounting to only 700 feet of piston speed at 25 miles an hour. In the normal operation of the engine it is always throttled down much below the maximum capacity, this maximum capacity being called upon only for the severest hills and the highest speed. The power is such that very steep hills may also be mounted at 7 or 8 miles an hour if desired.

They also claim that this vehicle runs quieter than any gasoline vehicle at present on the market, because all normal running is done on the high speed gear from 5 miles an hour up to the limit of the speed. This is made possible by the four cylinder engine and by the special carburetor.

The throttle and ignition advance levers are arranged on each side of the steering post in convenient position for the hand. The change speed lever is located at the side of the vehicle, forward position giving the fast speed and rear position the slow speed. The brake is located convenient to the right foot and the backup is convenient to the left foot. This releases itself and can be used as a brake in descending steep hills.

The Franklin Company are also making a light tonneau to weigh about 1,250 pounds with the same engine water jack-



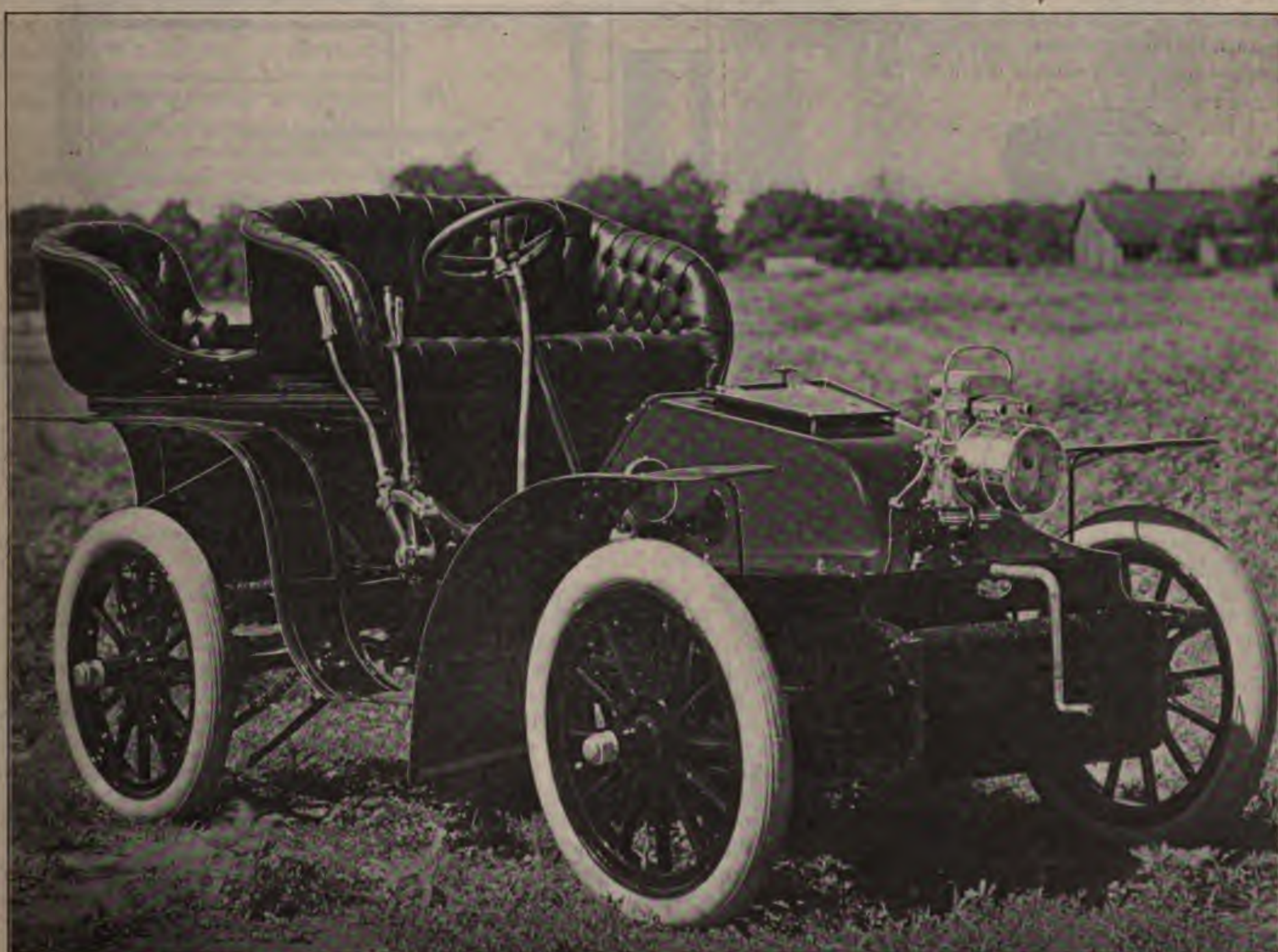
LEFT SIDE VIEW.

eted. This will have a somewhat longer wheel base and the tonneau will be detachable, so as to make a powerful touring car if so desired. A much heavier tonneau with powerful four cylinder engine is also under construction. This engine will have the same simplicity and the same ease of control as the smaller engine, and will be a radical departure in this regard for large cars. This car will weigh about 2,500 pounds and will be capable of any speed uphill or otherwise that one could desire. The size of the engines in this wagon is 5 inches stroke and 5 inches bore.

The Hoffman Automobiles.

The Hoffman Automobile Company, who occupy the factory building of the Hoffman Bicycle Company, of Cleveland, Ohio, have recently completed their new model steam machine, which has several points of novelty. The body is made of sheet metal and is of French design, but differs in respect to the location of the engines, which are under the seat, while the hood merely covers the water and gasoline tanks. It is hung on semi-elliptical springs, but the reach is retained. Tubular wheels are used. The wheel steering gear, with inclosed screw of peculiar design, is used, one turn of the wheel throwing the front wheels hard over. It is so arranged that any lost motion may readily be taken up. The wheel base is 6 feet 7 inches. The generators are of the flash type, built of heavy Shelby tubing; all joints and connections are so arranged as to be remote from the most intense heat of the burner. Above the generator proper are feed water heaters and superheater coils. The manufacturers claim to get very high efficiency out of the boiler. The steam generating coils are all subjected to a cold water test of 1,000 pounds. The regular crosshead feed water pumps are used, supplemented by a powerful yet easy working hand pump.

One novel feature about the machine is



GASOLINE TOURING CAR OF THE INTERNATIONAL MOTOR CAR COMPANY, TOLEDO, OHIO.

the air pump for maintaining the pressure in the gasoline tank. This is operated by a foot lever (at will), and thus the pressures are maintained without laborious use of a hand pump.

The engines are double 3x4 inches, and possess novel features. Ball bearings are used throughout. All machines are equipped with powerful brakes, the bands of which are in two sections of solid bronze running on a friction drum of bronze.

The machine is under perfect control of the operator, and great variations of speed may be attained.

The Hoffman Company have about completed a gasoline machine, which will be ready for the market in August. The engine is single cylinder, four cycle type, 4½x6 inches. The head and cylinder are cast in one piece, all of which is water cooled. The mechanically operated valves are in the head. The crank shaft has very long brass bushed bearings. A Longuemare type carburetor furnished the mixture. The speed changing gears are entirely encased and are operated by two levers, giving two speeds forward and one reverse. The machine complete weighs 700 pounds and will be sold for $800.

The Besly Oil Cup for Automobiles.

Charles H. Besly & Co., 10 North Canal street, Chicago, Ill., have designed a special oil cup for automobiles. It is similar to their regular Badger cup, with the exception that it has double depth or ca-

pacity, and that the stem is proportionately larger. The cup is made of cast iron, and can be operated by hand or wrench. The base, having a round thread, will not strip, clog or cross. The stem is made of bar steel, drilled and threaded, and will not break off in the oil hole.

The Stockbridge (Mass.) Protective Association, in order to prevent the speeding of automobiles through the streets of that town, today voted to engage a special policeman, to be mounted on a bicycle and armed with a stop watch with which to time automobilists between certain marked sections of the main street. He will be employed for the next three months and to watch automobilists will be his sole duty.

MOTOR VEHICLE PATENTS..

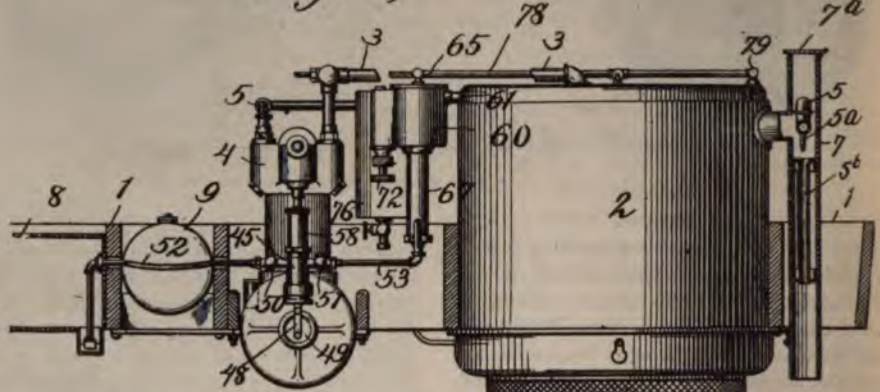
United States Patents.

704,907 and 704,908. Apparatus for Generating Steam or Vapor.—Edward C. Newcomb, Jamaica Plain, Mass. July 15, 1902. Filed June 7, 1901, and April 3, 1902, respectively.

The invention has special reference to apparatus for generating steam and delivering it at a predetermined degree of super-heat. By the use of the apparatus the superheated steam may be delivered in a condition which as to temperature or pressure, or both, is substantially unvarying, or so as to bear some other definite or predetermined relation to the demand for energy, regardless of any variations of that demand within the capacity of the apparatus, and also to the provision of an apparatus whereby a supply of such steam may be maintained without involving the use of a considerable quantity of potentially active reserve energy. The apparatus is automatic in its operation and easily controlled. The generation of thermal energy is varied in substantial unison with the variations of demand for thermal energy and in substantially the same degree with said variations. The supplies of feed water and fuel are varied in unison with the variations in the demand for thermal energy contained in the heated fluid and each according to a definite quantitative relation to said variations.

Fig. 1 is a side elevation of the apparatus as a whole, and Fig. 2 is a plan view of the same. Figs. 4 and 5 illustrate details in section. In Fig. 6 the feed pump is shown in section, while Fig. 7 illustrates the devices for automatically regulating the flow of the fuel. Fig. 8 is a diagrammatic view of a form of valve needle used in connection with the regulator (Fig. 7), and Fig. 9 shows another form of regulator. Figs. 11 and 12 are elevations that illustrate modifications of the apparatus. In Fig. 1 2 is the boiler, 4 the motor and 3 the steam pipe. The exhaust pipe 5 conducts the exhaust to the muffler 6 and another pipe carries it into chimney 7. The inventor does not confine himself to the use of his special generator, which is shown in section in Fig. 3, but prefers this type because it heats the water gradually and

Fig. 1,



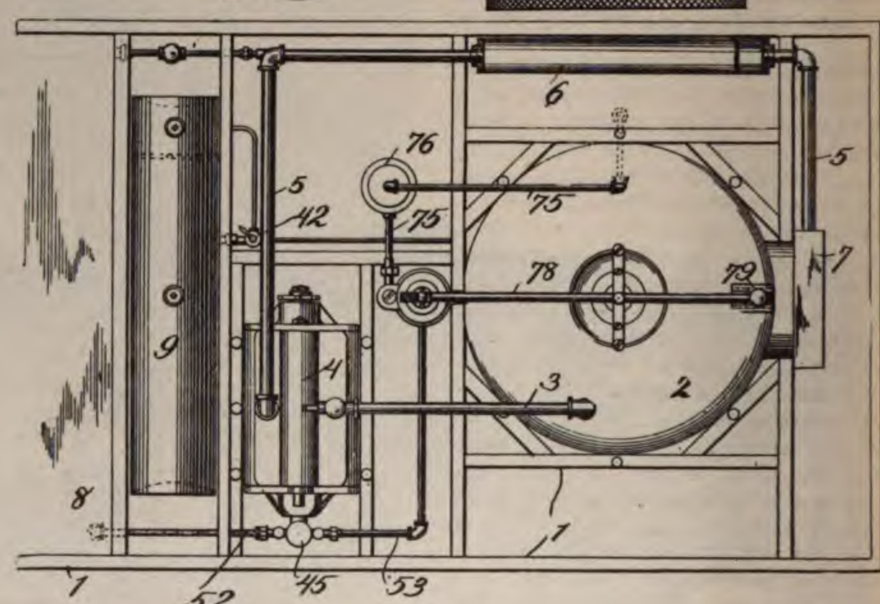
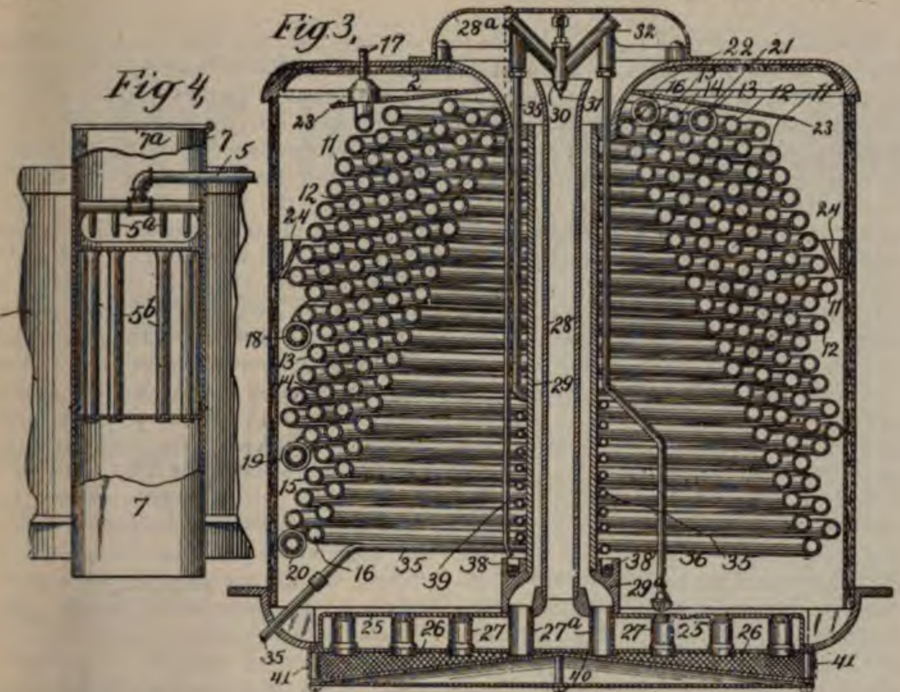
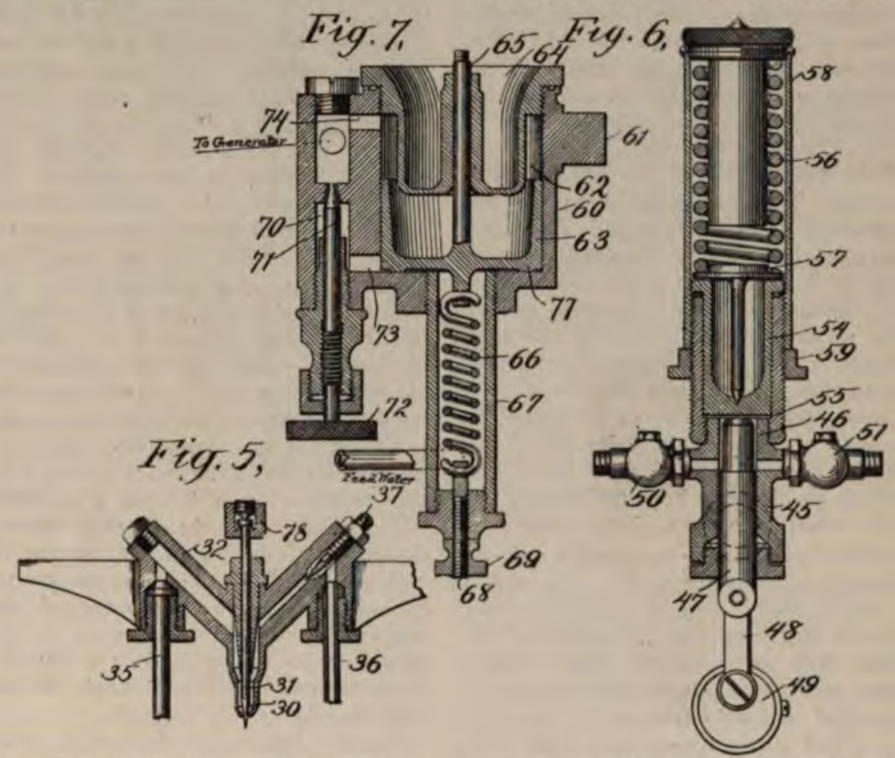


FIG. 2.

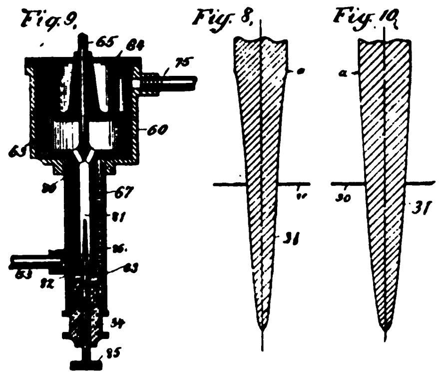


progressively from its point of entrance to the point where it is substantially all transformed into vapor, and in which only a small quantity of liquid is maintained at the temperature of vaporization corresponding to the pressure at which the apparatus is operated. Where the condition of the fluid in the generator is utilized to control the supply of the liquid or the fuel, or both, the generator should be so constructed that the rate of variation of the controlling condition varies inversely with the quantity of water in the generator. The latter consists of a continuous pipe, which forms the liquid heating as well as the vaporizing and superheating portions. The water is received at one end of the tube and delivered as superheated steam at the other. The pipe coils 11-16 are frustro-conical in form and so arranged around the combustion chamber as to present the greatest mass or depth of heat absorbing surface. The coils are connected in series by the separable connections 18, 19, 20, 21 and 22. Coil 11 is connected at the top to the feed water supply pipe 17, and the innermost coil is connected to the steam pipe 3. The outer portion of coils heat the liquid, the innermost vaporize and superheat the water and saturated steam, respectively. The cut (Fig. 3) shows but six coils; it is obvious, however, that more or less may be used. The inventor makes it a point that the water should be brought to the boiling point at some part of the generator, where its flow at that point is not appreciably affected by gravitation. The chimney 7 is open at the bottom and the exhaust pipe 5 of the engine is terminated in the chimney with a series of downwardly projecting nozzles 5^a, through which the exhaust steam is ejected when the engine is running, a draft being thus created to carry away the waste gases. A tube 5^b is preferably arranged below each of the nozzles in such a way as to increase the aspirating effect of the steam jets and improve the draft. The cover 7^a is opened when starting up the burner. Any suitable form of liquid fuel burner may be employed. For the one shown special claims are made, notably the inability of drafts of air extinguishing the flame. The wire screen 41 breaks up blasts of air and heats it by giving off heat which it has itself been continually absorbing. The arrangement of the burner elements is such that the vaporized fuel is maintained at a higher temperature than that at which it condenses, and by reason of the fact that the air is heated before it is brought into contact with the fuel the latter does not have to be superheated to such a high degree as would otherwise be necessary to prevent condensation. Thus coking, either in the fuel vaporizer or in the combining tube, is obviated. The fuel is admitted to the combining tube at a uniform pressure, which results in a uniform mixture of air and gas for all loads. The combining tube enters the burner at a central point and at right angles to the general plane of the burner. It is said that a very even distribution of the fluid mixture is obtained in this way, and that the burner may be operated with a very low flame without danger of "back firing" and with perfect combustion.

The device which supplies the water to the boiler is constructed in such a manner as to feed the water at a predetermined pressure and as to be rendered operative by variations in the pressure of the steam. Fig. 6 shows the feed pump, which is driven by the engine shaft as shown. The plunger 47 operates in a cylinder, which has connections for the fittings 50 and 51 that contains check valves. There is a loose piston 54 in a cylinder above the plunger's cylinder and a coiled spring that holds this piston down. It requires the



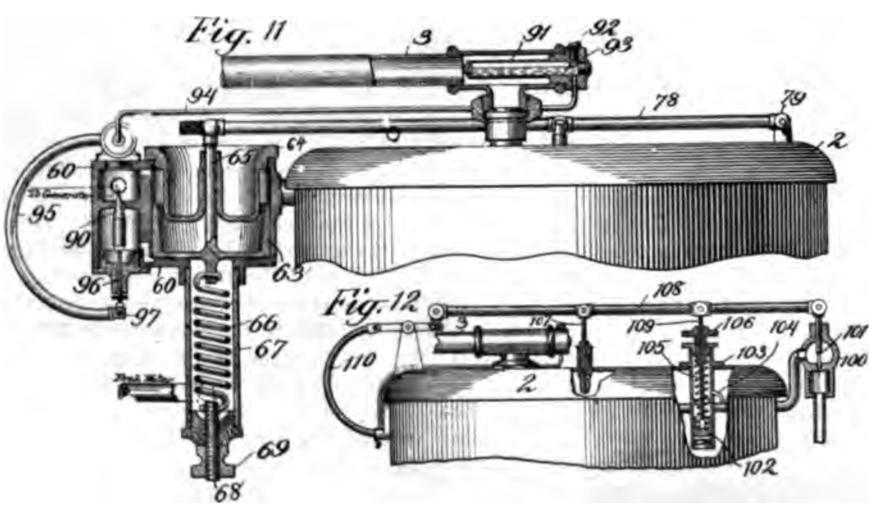
pressure maintained in the boiler to raise the piston. When the pump is at work the piston 54 rises. The higher the boiler pressure the greater the lift of the piston, and as soon as the pressure in the generator reaches a certain limit no water is fed to it. A device which maintains a predetermined relation between the supply of the fuel and the supply of the liquid to the generator is illustrated by Fig. 7. The flow of the fuel is regulated by the flow of the feed water to the boiler. In the cylinder 60 there is a piston 63 which has a piston rod 65 that works in a valve guide. The full boiler pressure rests on the upper area of the piston and the lower area of it is subjected to that pressure plus an amount sufficient to overcome the resistance of the passage 70. The tension of



the spring 66 is so adjusted that when the piston 63 is at the bottom the force of the spring will equal the force exerted by the pressure in the generator upon an area equal to that of the piston rod 65. When the pump is started the piston 63 will be lifted by it and a flow of water to the boiler will take place. As the velocity of a fluid through a passage varies as the square root of the difference in pressure on opposite sides of the passage, the distance of piston 63 from the zero point will vary directly as the square of the velocity of the fluid flowing through the passage 70, and for any adjustment of the area of the passage directly as the square of the volume of the flow through said passage. The movement of 63 is communicated to 31 of the fuel regulating valve by the lever 78. To get the proper flow of fuel, i. e., in order that it may vary directly with the volume of flow of feed water to the boiler and in the same degree, a special valve (see Fig. 8) must be employed to produce this result. Assuming that the orifice of the nozzle 30 presents a thin circular edge, the valve should have a cross section which decreases in diameter from the base of the valve toward the apex. The formula for the decrease is $d=\sqrt{1-m}$, in which d is the diameter of the valve at any point and m is the corresponding distance from the base or zero point a of the opening of the valve. Fig. 9 shows another type of regulator, which is a modification of the one described and self explanatory. The supply of fuel in this system being under uniform pressure, a proper form of the member 31[1] of the fuel valve to be used in connection with this form of regulator to cause the flow of fuel to vary in the same degree as the flow of water varies is that of a paraboloid or such as that produced by the revolution around its axis of a parabolic curve, the general formula of which is $y^2=2px$. Fig. 10 illustrates such a form, diagrammatically.

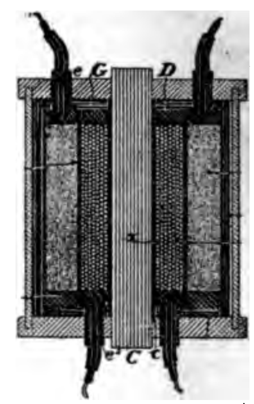
Wherever it is desirable to deliver steam at a very uniform temperature, means must be provided for the automatic variation of the ratio between the flow of water and that of fuel in accordance with the temperature variations of the steam as it leaves the boiler. Figs. 11 and 12 illustrate devices intended for the above purpose. The latter being but a modification of the former it will suffice to describe Fig. 11 only. The tube 91, which is located in the steam pipe, contains a fluid that vaporizes at a temperature considerably below that at which it is desired to deliver the steam, so that when the liquid is heated to the temperature of the steam a portion of it will be vaporized and create a high pressure in the receptacle. The interior of the latter is connected with an ordinary Bourdon tube 95, which operates the valve 90 that regulates the restricted passage of the regulator. The tube 95 is constructed in the form of a half circle, one end of which is fixed to the top of casing 63 in line with the axis of the valve 90, the other end being free and connected to the valve below the casing by means of a stem 96 and a pivot 97. As the pressure varies in the receptacle 91 the valve 90 will be so operated as to vary the opening directly as the pressure varies. It follows from this construction that when the temperature of the steam flowing from the generator rises beyond a predetermined temperature the passage through the valve 90 will be enlarged, thereby reducing the difference in pressure on the opposite sides of the piston 63 and permitting the same to move under the influence of the spring in such a direction as to decrease the flow through the fuel valve carried by the lever 78.

The ratio between the flows of the water and the fuel will thus be increased and will continue to increase until the relative flow of water is increased to the point required to deliver the steam at the desired lower temperature. On the other hand, it will be seen that if for any reason the temperature of the steam should drop below the predetermined degree the ratio between the flows of the water and the fuel will be decreased until the flow of water is cut down to the point required to deliver the steam at the desired higher temperature. The predetermined degree of superheat may be adjusted by varying the position of the valve with relation to the Bourdon tube, as by screwing the stem 96 into or out of the pivot block 97. It is to be noted that this auxiliary thermostatic regulation would not be practiced when the apparatus is subjected to sudden variations, for the reason that the temperature of the superheated steam varies directly with the rapidity of its flow past the superheating surfaces and independently of the heat supplied by the burner during the variations in the flow of the steam. This thermostatic regulation therefore will not operate in substantial unison with the variations of demand when these variations are sudden.



704,589. Sparking Coil Casing.—Charles F. Splitdorf, of New York. July 15, 1902. Filed April 30, 1902.

Comprises a coil casing composed of an outer shell of fibre or other tough material that is a partial non-conductor, and an inner shell as of a sheet of rubber



rolled upon itself in several plies to form a thorough insulator. The cylinder caps are similarly protected with rubber disks; and flexible bushings extend from the terminal openings to prevent abrasion of the terminal wires.

704,767. Secondary Battery.—Edward G. Steinmetz, Philadelphia, Pa., assignor to the Electric Storage Battery Company, Philadelphia, Pa., a corporation of New Jersey. Filed September 29, 1900. Serial No. 31,593. (No model.)

704,859. Electric Accumulator Electrode.—Victor Cheval and Joseph Lindeman, Brussels, Belgium. Filed November 21, 1901. Serial No. 83,108. (No model.)

704,759. Storage Battery Separator.—Hugh Rodman, Philadelphia, Pa., assignor to the Electric Storage Battery Company, Philadelphia, Pa., a corporation of

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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The New English Motor Vehicle Bill.

The new automobile bill which is now before Parliament, in England, providing for the registration of automobiles and the abolition of the existing speed restriction, is probably destined to have a hard fight in the House of Commons and is hardly likely to reach the Upper House this session. The concession which automobilists make in agreeing to registration, thus putting themselves more in the power of the police and the mischievous informer, it is argued, should so far conciliate the opposition that all speed restrictions will be abolished and the common law against driving to the public danger be allowed to cover the ground of automobile as well as other violations. Perhaps when the strength of the opposition in England is considered this is too much to hope for, even if it were really desirable, but it is quite certain that as a result of the agitation the present unreasonable limit of 12 miles an hour will go the way of the Red Flag law of 1896.

Strong pressure is being brought to bear upon members of the House to insert in the bill some entering wedge whereby in June next the Gordon Bennett race may be run on English soil in the early morning hours when traffic would be least interfered with. We shall be considerably surprised if our sturdy English cousins yield so far to the wiles of the siren sport as to permit an event of this kind on their common roads. A temporary stimulus would no doubt be felt in motor circles as a result, but it would be along false and ephemeral lines and would ultimately prove detrimental to the industry by promoting the construction of racing machines and by encouraging the senseless craze for speed on common roads.

From the present act to a no restriction law—nay more—a road race, is a pretty long jump and we doubt very much whether English conservatism is capable of it.

Scene of the Next Gordon Bennett Race?

Racing enthusiasts in Great Britain are so well aware of the unlikelihood of their obtaining the desired consent of the Government that they are looking elsewhere for the scene of the 1903 event. Ireland is spoken of as a possible last resort, though it is acknowledged the roads are so bad there as to make very high speed out of the question. Meanwhile other feelers are out. Hope is expressed that permission may be obtained from the authorities in some one of the New England States if enough Americans can be prevailed upon to enter vehicles for the forthcoming race to arouse a popular interest among us.

In the present temper of the American public toward the high speed automobile it is extremely doubtful whether any officials could be found here who would be willing to incur the displeasure of their constituents by sanctioning a race of this kind. Even if the influence of the sporting contingent of the automobile fraternity should be strong enough to overcome official objections and the blunder should be committed, it is not likely to be repeated. One object lesson would probably be enough, with its resulting evil tendencies, to put a stop to such practices in America forever.

Winter Use of Automobiles.

On another page Charles E. Duryea, in a communication, refers to the winter use of automobiles and urges manufacturers to direct special efforts toward the sale of automobiles during that season, even to the extent of reducing prices and using special means of proving the availability of the automobile for winter use.

Up to the present, it must be confessed, serious difficulties attend the use of the automobile during the severe winter months. All of these difficulties have been thoroughly ventilated in our columns by users who have "been through the mill" and Mr. Clough has suggested that a test be organized during the cold season in order that we might gain more knowledge of the causes of these difficulties and so be better able to remedy them. No club or other organized body has as yet shown any disposition to act upon this sugges-

tion, but we hope a midwinter contest may be arranged for next season. The only practical way to correct the prevailing impression that automobiles are fair weather vehicles only is to remove faults in the present machines that stand in the way of their more extended use in winter, and the way to remove these faults is to recognize them, investigate their causes, and advertise them broadly in order that as many thinking minds as possible may be interested in their correction—and they will be corrected. Otherwise the evolution of the automobile will be delayed and cold weather service will be unsatisfactory for some time to come.

A cold weather test is one of the urgent needs of the industry. Don't let it be forgotten in the clamor for races.

New York Courts to Deal With Speed Offenders.

At last the courts are beginning to speak on the speed question. In New York city last week the presiding justice of the Court of Special Sessions, in sentencing a chauffeur who had been arrested for violating the speed law, gave public notice of his intention to inflict upon such offenders henceforth the full penalty of the law unless there were extenuating circumstances to modify the case.

The offender then before the bench was an employee of a wealthy merchant, who, it is stated, was sitting beside him at the time of the arrest and protested to the policeman against detention because he was in a hurry to get to his dinner.

It would appear from this that the employer himself aided and abetted the employee; in fact, was himself the direct cause of the violation of the law, inasmuch as he must have given orders to his chauffeur to drive fast in order that he might be in time for his dinner.

In such cases it is no more than right that the owner of the machine should be held as at least contributory to the offense, if not chiefly responsible. Many of the chauffeurs who are guilty of habitual excesses are only imitating their employers or basing their hope of immunity on the wealth or station of their employers. In a country where the law is supposed to be enforced without prejudice or discrimination on rich and poor alike it is worthy of notice that some of the very worst offenders of this class have never been arrested.

Is it because they are rich?

Tire Standardization.

Complaints are frequently made nowadays by rim and tire manufacturers over the number of lugs used in connection with pneumatic motor tires. One tire maker attaches five lugs to a certain size of tire, while a competitor employs six or seven of them. The number of lugs in use varies between five and eleven, which include all the tire sizes from 26 inches diameter to 36 inches and more, with cross sectional diameters varying from 1¾ inches (which is intended for motor cycles) to 4½ inches, a tire used on a well known make of racing vehicle.

It is surprising that tire manufacturers have not yet gotten together to establish standards, but still continue to equip their products with as many lugs as any individual amateur builder of an automobile may fancy he needs. The pneumatic tire industry is in the same position today that the machinery business was in when every machine shop in the country had its own standard threads.

The automobilist who is in search of a new tire to replace one that is worn out in the majority of cases is not able to get one from any dealer or maker direct from the shelf. He must put up with vexatious delays and, if he has not ordered on time, he will be obliged to set his machine aside until the new tire has arrived.

A prominent rim maker is trying to establish standards of his own in regard to the number of lug holes. We believe that manufacturers of tires should take the initiative in this matter without further delay, and we earnestly hope that the N. A. A. M. will look into the question at its next meeting.

Evolution of the Spark Plug.

It is gratifying to observe that so much is being done, both in this country and abroad, to solve the many problems presented by the spark plug. Some time ago a description of a new American plug appeared in THE HORSELESS AGE. Among its good features is a porcelain, with ample fillets. Such insulators are not so liable to crack, a point which is of great importance. The German plug ("Rapid") which was described in these columns recently has a double conical porcelain core, which is practically the same way of solving the problem. The method of compensating for the unequal expansion of porcelain and rod is a simple one. A coiled spring is interposed between the insulator and the terminal nuts. This spring is always under tension and holds the head of the rod up against the porcelain. The joint is always tight; it is practically impossible to crack the porcelain by drawing up on the binding nut too much, and the latter will have a slight, if any, tendency to work loose, due to the pressure of the spring. The French plug described apparently is not so good and should not prove so satisfactory as the "Rapid," because it will take some time for the copper tube to expand. The spring, on the other hand, is always ready to take up the "slack."

Some ingenuity has been displayed by various designers of spark plugs in connection with the construction of self locking nuts or devices to secure them in place. One of the most practical is that of the "Perfection" plug, described in the issue of July 16. The lower binding nut is tapped to admit the terminal rod. There is a sleeve extension at the top of the nut which is threaded to a taper and is also split. A knurled jam nut is screwed down over this extension until it binds and makes the female thread of the main nut bind the male thread of the terminal rod. The inventor of this plug claims to have found a solution for the vexed problem of splitting and rolling mica by machinery. The performance of his plugs in actual practice will be watched with interest by the manufacturers of gasoline vehicles and users as well.

Slippery Roads.

Owing to the continued rains during the last few months the roads have very frequently been in an extremely muddy and slippery condition and there have been, as a consequence, a considerable number of automobile accidents due to skidding or side slipping. In spite of the general lengthening of the wheel bases skidding seems to remain a serious source of danger, particularly since at the same time as the length of wheel base the power and speed of the machines have also been increased. It must, of course, not be forgotten in this connection that a large proportion of the machines at present in use are still of the earlier types and have a comparatively short wheel base.

Among the factors determining the degree of skidding on muddy roads is the

width of the tire tread, a narrow tread reducing the tendency to skid. Of course, we should not recommend the use of a tire having naturally a narrow tread—i. e., a narrow tire—but why cannot a narrow tread be successfully combined with an ample width of tire? A tire of this kind has been on the market in England for a considerable time and, according to reports, has proved quite satisfactory, although the degree of its effectiveness in preventing skidding could hardly be stated in definite terms.

A prominent French tire manufacturer states that he is frequently asked why he doesn't manufacture tires with narrow tread, and in reply he asserts that according to experiments carried out by his firm the narrow tread tire consumes more power than a tire of the conventional form. He gives some figures claimed to be the results of an experiment which show a rather large advantage for the wide tread tire in this respect, an advantage which we feel sure could not be obtained in ordinary use. Granting, however, that the narrow tread tire is less economical in power, we believe that something might well be sacrificed in this direction to secure a greater freedom from skidding on muddy roads.

Operators of automobiles should be reminded that the danger of skidding calls for the greatest caution on muddy roads, especially in turning corners. A judicious handling of the steering gear often reduces danger of skidding.

Speedometers Required by Law.

It has repeatedly been urged in the public press that automobiles should be required to be equipped with registering speed meters, to enable the police to verify at any time the speed at which a vehicle has been running. At a first glance such a measure would seem to furnish a practical solution of the problem of how to enforce speed limits in automobile traffic, but upon closer investigation many difficulties become apparent which at present at least preclude the adoption of such a regulation.

It will be admitted that an instrument the reading of which may be used in court proceedings must be of a high degree of accuracy. Abroad, where automobilists are sometimes timed by the police with stop watches, objections are frequently made to the results of their readings on account of the alleged unreliability of the particular kind of watches with which they were equipped, and unless speed registering instruments could be made with a degree of accuracy approaching that of stop watches the requirement of carrying such instruments would be objected to by automobilists, and for good cause.

Now, registering instruments of commercial types are, as a rule, much less accurate than simple indicating instruments, owing to the additional friction of the registering apparatus. In addition, the uncertainty of the friction drive, which, it appears, has thus far been used exclusively for this purpose, introduces an element of inaccuracy, although not of a kind to which chauffeurs might object. The vibration of the vehicle would be detrimental to a sensitive instrument, and might be expected to disarrange it in time.

Aside from the factor of accuracy the cost has to be considered. When the cost of production is not limited it may be possible to construct a fairly reliable instrument. However, the aim of automobile builders is to improve and cheapen transportation, and they have, we believe, to contend with so many difficulties already that the authorities might well spare them the annoyance of requiring all vehicles to be equipped with such delicate and expensive instruments as registering speed meters would necessarily have to be. From the drivers' standpoint the simple indicating speed meter serves the same purpose. The fact that no registering speed meter has yet been placed upon the market indicates either that chauffeurs feel no need of such a device or that the production of a practical instrument of this kind presents great difficulties.

According to accounts in several of our English contemporaries, Mr. Edge, winner of the Gordon Bennett cup, had trouble with his sparking coil. A Wolseley machine experienced the same trouble on its way to Paris. It is also stated that it is well nigh impossible to get good body suspension springs in England. Here are opportunities for American manufacturers.

New York-Boston Test.

The committee of the Automobile Club of America at a recent meeting decided upon the six days beginning Monday, October 6, as the most suitable time for the New York-Boston "reliability trials," as the club prefers to have the test designated.

Kerosene Number, May 28, 1902. Price, 10 cents. What Has Been Done—What Is Needed.

Sweet Are the Uses of Adversity.

By Albert L. Clough.

It is a fact that strenuous competition besides being the "soul of trade" is the greatest guarantee of progress in any art. When an art has reached a condition of supremacy, or in the vernacular is on "Easy street," then there is danger of a loss of prestige through overconfidence and indifference.

A few years ago the light steam carriage had been brought to a certain state of utility and appeared to be destined for a wide sphere of application. At that time the gasoline vehicle was relatively crude, for the art of applying internal combustion motors was itself in a crude state, while the art of steam propulsion seemed to have almost reached finality. The gasoline vehicle at that time was unquestionably the "under dog," in the public estimation at least, and those interested in its development were spurred on by the success of the light steam carriage to most energetic efforts to improve it in such ways as to secure for it the confidence and favor of the public. The progress which was thus made is a matter of common knowledge and has resulted in the development of gasoline vehicles which are far along on the road to ultimate perfection. So good have the gasoline vehicles become that one can hardly be gainsaid in making the statement that they are the popular favorites today in communities which are really enlightened upon the subject of mechanical traction.

So great has the popularity of the gasoline vehicle become that in many localities it seems to be the only motive power under serious consideration for pleasure purposes, and the business which has been done in gasoline automobiles has been so large that it has taxed the energies of the manufacturers of these vehicles to keep up with the influx of orders, and has, perhaps, fostered in them a spirit of independence and caused them to rest upon their laurels as if the victory were won. It is a notorious fact that when business is good in certain lines progress in that line is slow, owing to the fact that all energy is devoted to regular production and no opportunity presents itself for experimentation or the working out of new ideas.

The result of the great popularity of the gasoline carriage seems to the writer to have been to render improvements in gasoline carriages during the last year very few and far between. In fact, nothing radical has come into the business since the Madison Square Garden Show in November last.

IMPROVEMENT IN STEAM VEHICLES.

On the other hand, what has been the effect of the sudden popularity of the gasoline carriage upon the manufacturers of steam vehicles? There can be no question that it has been to stimulate invention and improvement in the application of this

motive power to a degree that is fast eliminating some of the surface objections to steam as a prime mover. Under the successful competition of the gasoline motor the flash boiler has been developed to a state of considerable efficiency and the air condenser has been brought into use, and the application of high pressure and superheated steam has become quite general. Within a short time, under the same stimulus, means have been found to do away with the gauge glass, that bête noir of the steam carriage operator; gasoline and water consumption have been greatly reduced, burners have been better protected against the wind, engines in some cases have been incased and the chain drive in some instances discarded. A few years ago it would have been declared impossible to improve steam practice in any such degree, and this doubtless would have been so had it not been for the great success that was attending the gasoline vehicle. The fact that gasoline as fuel for steam carriages was most uneconomically applied and most economically applied in the internal combustion motors used on the gasoline carriages was appreciated by the steam manufacturers, and they were conscious that they were at an obvious disadvantage in respect to radius of action and economy of operation and set out to rectify it. The result is the development of the kerosene burner, the air condenser and the use of superheated steam.

It will be most interesting to see whether, with the impetus which has been given to the improvement of steam carriages they once more become the popular thing, and in case they do, whether the manufacturers of gasoline machines will be driven to make relatively as radical and as important improvements as the steam carriage builders have lately done. No doubt these fluctuations of popular favor are necessary to get the best out of each motive power and to eliminate objectionable features, and it is equally true that the undisputed success of either motive power has been shown to have a deadening effect upon success in that particular line.

Features of Body Construction in Recent Foreign Machines.

By Hugh D. Meier.

In the earlier days of the automobile industry, and even up to two years ago, little had been done toward the production of self propelled vehicles which did not suggest a horse. Today, however, few motor vehicles are built of the type which at one time was termed the "horse-wanted pattern." Machines with short wheel base are built only by amateurs at present, if at all. The plain dash today is found only on electric vehicles. Carriages with motors under the rear of the body have a boot in front and all those of the other pattern are equipped with a metal bonnet.

The light steam vehicle was at first

Fig. 1.

built on the lines of the horse drawn "bike" or runabout, with small wheels of the suspension variety, leather dash and high centre of gravity. The steam carriage of today, unless it be a "touring car," is not so good a representative of the up to date automobile as the average standard gasoline car, because it is not designed along the accepted lines which designers of explosion motor automobiles embody in their vehicles. Long wheel bases and a standard tread permit the use of deep and wide seats and proper spacing of front and rear seats. Like its prototype, the horse drawn surrey, the steam surrey has frequently been built with a short wheel base and improper spacing of the seats, i. e., the rear seat is so close to the former that the occupants cannot ride with comfort. Where long trips are made, which the automobilist often takes, comfort is a desideratum. There should not only be ample room for the feet but the footboards should be inclined so that all the occupants may remain seated without holding on to the arm rests, even though the car is brought up suddenly by an obstruction or by the brakes.

Nearly all improvements in body construction that are now being made in this country and abroad are made with a view to promoting comfort. Wide mudguards or fenders are in almost universal use, for this reason; though all those of the bent type offer great resistance to the passage of air. Flat fenders are sometimes employed in connection with the rear wheels of large touring cars. Fig. 1 illustrates such fenders fitted to the sills of a racer so as to prevent mud from being splashed into the operator's face. Mudguards that are curved like those of a bicycle, i. e., of a crescent shaped cross section, and that are attached to their respective knuckles on the inside, and to the hub of the wheels on the outside, must have a bearing in which the hub or an extension of it revolves. When applied to front

Fig. 3.

wheels, as assumed in this case, they will turn with the wheels when the operator steers and afford complete protection. The deflection of the body springs does not affect them, as there can be no relative change of position between such a fender and its wheel. In radius they are but little larger than the radius of the tire, and they need be but slightly wider. Their only bad feature is the bearing. However, their advantages more than make up for this. Front wheels thus equipped are in effect not hidden from view, so that the operator is enabled to steer and observe the relative position of the front wheels to the sills at all times. On crowded city thoroughfares it is, at times, necessary to

Fig. 2.

FIG. 4.

drive up close to the curbstone in order to pass or overtake another vehicle. If no fenders at all or the bicycle type of fenders are used one may drive up close to the curb without fear of running into it and bruising tires and rims, because the wheels can, in these cases, be seen.

When running at a fair speed on wet streets the front road wheels will splash more when they are deflected from their course than when running ahead, and if the mudguards do not protect well muddy water will soon cover the face and clothes of the occupants. Fenders of the different varieties that are attached to the body or framework must be wide to prevent what may be termed "side splashing." The writer believes that the "bicycle type" of mudguard is only used and has only been in use in the United States.

In a high speed machine it is essential to present as little surface to the air as possible. Some foreign designers soon hit on the idea of enclosing the side entrances, or, in other words, extending the panels forward to the bonnet (see Fig. 1). It is a very unpleasant sensation to have air rush up one's trouser legs on a cold day, and so far as draft is concerned, the effect would be the same when driving at 20 miles an hour against a 30 mile wind, as it would when driving at the rate of 50 miles an hour in a perfect calm. Ere long we may, therefore, see medium speed touring automobiles fitted with wind shields of this type. Why not make them on the principle of the roller shade and fasten the roller to the boot or dashboard?

Metal dashes behind the bonnet are now employed by a prominent English manufacturer. The halftone Fig. 2 illustrates a large touring car with such a dash. It is curved backward at the top and on the sides so that some protection is afforded the operator. Attention might be called to the canopy top, the curtains on the side and the bent plate glass windows. The tonneau of this machine will accommodate six persons and is certainly large and roomy. In fine weather the top and windows may be removed. With the latter in place there can be but little inconvenience on account of dust. Sometimes a seat is attached by hinges to the door of the tonneau so that three passengers may occupy that part of the carriage and look in the direction of motion. In this case the back rests are invariably made very high for protection against the dust. Another English builder has solved the dust and rain problem in the way shown by Fig. 3. When the weather is fair and the roads not too dusty the tops are let down as in the end elevation on the left.

FIG. 5.

It is said that a demand for enclosed vehicles for use in the city and in the country as well, has sprung up in France. To meet this demand manufacturers have developed the limousine with either rear or front entrance, coupés, hansoms, broughams and landaus. The last four types are frequently built on conventional horse drawn vehicle lines (see Fig. 5 for instance). In such cases the front wheels or rear wheels are driven by electric motors, or, in case it is a gasoline engine, it is located under the driver's seat, which is readily removable. This is not the case in the brougham (Fig. 5), where the motor is in front and where that portion of the body which does not belong to the rear seat may be removed, and the carriage converted into a surrey.

In France, where motorists purchase complete machines minus bodies, and then have the bodies made by specialists, according to their specifications, the varieties of bodies are numerous. No doubt some of the popular types of bodies were invented by enthusiasts not connected with the industry.

Improvements in body construction and modifications of existing models have been made comparatively recently only. High grade automobiles of today have stronger, more comfortable, rational and well proportioned bodies than those of the average horse drawn pleasure vehicle. It seems as though, with the great variety produced, comes a demand for a machine well adapted to several purposes. The motor vehicle is no more a fair weather machine, and since the public is inclined to buy a carriage that will do service beyond the well paved streets of the cities, we may look for still more improvements in this branch of the industry.

The Locomobile Company of America has brought out a new vehicle with a top and rumble built especially for English trade.

New York Court Will Not Spare Reckless Automobilists.

Last week Justice Holbrook, sitting as presiding justice in the Court of Special Sessions, with Justices Mayer and Hinsdale as associates, declared in imposing the maximum sentence allowed by law (a fine of $50) on a chauffeur who had been found guilty of driving an automobile faster than the law allows that in future all offenders against the anti-speed law convicted by the court need expect no leniency from them, but would in all cases, except where there were strongly extenuating circumstances, receive the full penalty of the law.

The case was against Harry G. Larcum, a chauffeur, who was arrested at 141st street and Seventh avenue on July 13 after a chase of eighteen blocks. Larcum stated in court that he was employed by a woolen merchant who lives in Tarrytown. The policeman said on the stand that the machine was going at a rate of fully 20 miles an hour, although he had put the rate in the complaint as 15 miles. He also said that at the time he arrested Larcum the latter's employer was in the machine and declared it a "shame" to stop him, as he was in a hurry to get his dinner.

Justice Holbrook, in pronouncing sentence on the chauffeur, said:

"The reckless operation of automobiles in this city is getting to be a serious matter. Chauffeurs of automobiles seem to think that horsemen, pedestrians and others have no rights that they are bound to respect. This court is determined to put a stop to this manner of violating the law in this city, if possible. We can, under the statute, for a first offense, impose a fine of not exceeding $50. It seems to us proper that it should be generally known that we have made up our minds to impose a maximum fine in these cases, except under very extenuating circumstances.

"For a second offense this court has power to impose a fine of not exceeding $50, or imprisonment not exceeding six months, or both. The fine in this case is $50, or in default of payment twenty days in the city prison."

Larcum paid the fine.

The Chicago One Hundred Mile Run.

Members of the Chicago Automobile Club who have undertaken to test the route of the proposed 100 mile run during the past week have found much the same conditions which led to the postponement of the event until August 2, and are devoutly praying that the weather may be less humid between now and the later date than it has been, although they aver that the run will come off rain or shine.

About ten additional entries have been received, and it is fully expected that the total will reach thirty before the start.

..COMMUNICATIONS..

A Rational View of Automobiling.

SALEM, Mass., July 18.

Editor HORSELESS AGE:

In some way a number of your correspondents have gained an idea that I am a confirmed pessimist on the automobile question. That impression is an error. I am an enthusiast on automobiles in the abstract, but not altogether so when it comes down to the point of considering a number of examples of what are called high class vehicles now on the market. Yet I have paid out a good lot of cash in testing horseless carriages, and I expect to keep on doing so for several years to come, thus showing that I have faith in the future, and am willing to help the cause along.

Possibly I may have met with more than the ordinary amount of trouble, yet my careful investigation convinces me that others also have difficulties. The troubles come, naturally, in ratio to the amount of work done. Folks who carefully nurse a carriage all the week to get it in condition to run 25 or 30 miles on Sunday are not apt to complain. Those who expect to run a machine every day are more or less likely to be disappointed occasionally, even though they exercise care and keep the repair man busy when anything needs attention.

My three years' experience has shown me that nearly every make of horseless carriage has proven a rather costly experiment for the purchasers, and so far as I can see the newer machines are about the same.

A couple of years ago I had an idea that in time I might be able to use automobiles to the exclusion of horses at all seasons of the year. I yet have a hazy notion of a time when my stable will be horseless. At present, however, even though I have ridden in all American and foreign makes of automobiles, I have not seen one that will fill the bill. When real business is to be done, horses are usually hitched up, the automobiles being reserved for pleasant weather and pleasure purposes.

A SUDDEN OVERTURN.

A serious objection to using automobiles all the year is that in wet weather there is great danger of slipping on the streets, when the carriage gets completely out of the control of the operator. This feature rather cuts down practical winter use, for at that time there is likely to be a lot of wet in the streets, especially in suburban districts. This disadvantage was recently fully illustrated to me in rather a startling manner. I was running along on a good gravel road a day after a rain storm. In turning a sharp corner, at a speed of not over 8 miles an hour, the carriage suddenly darted directly across the narrow road, and started to climb a steep ledge. I did not have time to move a hand before the machine backed down into the road and capsized, with all four wheels revolving in the air. I landed directly under the carriage, but the heavy construction of the seat saved me from injury, as all the weight was borne by the solid back. I crawled out uninjured, and the carriage was found to be in practically the same condition, with the exception of a few splinters of wood. After the affair I looked the road over carefully, and found that there was a small amount of slippery mud directly under a tree. At that point the carriage had whirled around in a flash, although the steering wheels were pointed straight ahead. The steering gear is by wheel, and it is irreversible. I cannot see any way such an accident could be prevented, although, of course, if the speed had been 2 or 3 miles an hour the result would not have been so dangerous. So far as I can understand, the same thing might happen to any style of carriage. In fact, a week after my mishap a young man with a steam machine tipped out at the same place, and his carriage also landed with the wheels in the air. Such happenings are, however, a part of the game.

BEARING TROUBLES.

I really hate to pose as a writer of misfortunes, but troubles come along so regularly I cannot refrain from occasionally mentioning them. For instance, the other Sunday I made a run of about 70 miles, and when out 10 miles there was a shrill squeak from the rear, and I found that a roller bearing was running hot. I soaked in a lot of oil and the noise stopped. At the end of 30 miles we stopped for dinner, and before starting for home I examined the axle again. I found that the ends of the bearing were broken off, and they had worn a hole through the tubing that supports the axle. Fortunately I had a heavy iron ring on the end of the tubing, so that it did not break away. I ran home with the broken bearing and then took out the axle. To my surprise I found that the steel rollers in the bearing had cut into the axle over a ¼ inch for more than a foot in length, taking off the metal almost as though it had been in a lathe. The axle was so warm that water sizzled when thrown on it. Yet the carriage had run with about the usual speed. Of course a machinist was necessary, and it took five days to repair damages, as a tube had to be turned out of solid metal and brazed into the old part, while a new axle and roller bearing were necessary.

STEERING GEAR DANGERS.

On the subject of danger, let me tell of my experience with the steering gear. I had been out in the evening in a section where there were good roads, and with the spark well advanced I think I must have run over 10 miles an hour on the country roads. Anyway, the engine turned as fast as it could go. I noticed that the wheel turned rather hard, but supposed it was caused by grit in the gearing. The next morning the man who cleaned the carriage found that the main bolt holding the gear on the carriage had been broken so that it hung by a single thread, and that gave way while he was pushing the machine off the wash stand. There would probably have been a pretty mixup if that bolt had given out when the machine was moving on the road.

I cannot see how the maker of the steering gear can be held responsible, for the bolt he supplied was of steel, and strong enough to hold several tons. The connecting rods were not heavy enough to carry a shock that would break the bolt.

SPEED RESTRICTIONS.

In this section of Massachusetts there is a strong sentiment against the speedy automobiles, and in one town the chief of police has evolved a great scheme to catch the unwary automobilists. He has measured several streets within the 10 mile limit, and on Sundays has officers posted where they can see both ends of the course. With stop watches they time the machines, and so far have captured three lawbreakers. The plan appears to have worked well, for now automobilists who pass through the town do so at a walking pace over the 2 miles within the limits.

A COMPARISON.

In the matter of speed, I have frequently heard owners of steam carriages say that they could just walk around the "ice carts," as they call the heavy gasoline motors. As a test of that statement I recently rode over a 25 mile course with a friend who owns a fast steamer, without his knowledge that I was timing him. He went the limit of the machine when the roads permitted, but he had to slow down often on account of rough places. At times it seemed as though he was traveling 30 or 40 miles an hour, and he climbed hills in fine shape. Deducting the time wasted in taking water once, he was two hours and ten minutes in making the distance, and he seemed mightily pleased, especially as on the last few miles he raced with another steamer and won the contest. The next day I took my heavy surrey, loaded with four people, and went over the same route in thirty minutes less time, without a stop and slowing up when going through towns. I climbed hills slowly, of course, when they were long enough to require the slow gear, but my average speed was better than the steamer's because I did not have to slow down for rough roads.

I have often been challenged by owners of steam carriages to make a run of from 50 to 100 miles, but so far I have never had a chance to try the contest, because no time was ever fixed by the challengers. I cannot, of course, tell how my machines would hold up, but I have faith enough in them to undertake the run, for I think that my average speed would equal the steamers, while I should take chances on endurance. This will show that even

though I have seen much trouble I still have confidence that my luck might be as good as the other fellow's on a test. Luck, apparently, enters largely into the game, for where one carriage will go through a season without much difficulty, another of the same make will keep in continual trouble.

THE LUCK FEATURE

is one that must be eliminated before automobiles can be accepted as good substitutes for horses. This reminds me that the other night I was invited to go to a clubhouse a few miles out for dinner, conveyance being by horse power—a single cylinder hay motor being used. We made the trip to the house safely, and there met a friend who had come out with a steam machine. At 10 o'clock the horse was brought around and we started homeward. A few minutes before the owner of the auto had started to get his fire going. When we left he was on his back on the ground—with his best overcoat on—trying to find out why his burner did not work. He had to pass my house on his way home, and I watched until midnight, but I did not see him go by. The horse made the journey in twenty minutes, and the driver did not soil his hands or clothing. Herein is maybe the reason why so many people throw the cold stare at automobiles. The incident I have related reminds me that some weeks ago on a rainy night I had an important engagement and started out with an automobile. I went 2 or 3 miles all right, and then the engine stopped. It was raining pretty hard, but I had to climb down and, after unscrewing a lamp, investigate. I found that the eye of the gasoline needle had pulled out, so that it did not work. I was not provided with a drill, and so I had to devise some means for making things move. Finally I filed a groove in the needle and borrowed some small twine from a store. With this combination I managed to fix the needle so it would work after a fashion, and managed to start the engine, but I returned home, for I did not dare to risk a longer trip with the contrivance I had rigged. Maybe the wise automobilists will say that I should carry extra needles, but how could I tell that it was going to give out? The trouble might be with a tire, gear, chain, bolts or nuts. Who can know? The only safe way would be to tow another complete carriage, so that every part would be available.

MAKER AND USER.

Maybe my descriptions of automobile troubles are not relished by makers and some users, but what's the use of sitting back and saying: "Oh, well, I never have trouble," when we all know that if an automobile is used it will make trouble? Some of the men who fly the "no trouble" signal must lie worse than fishermen. One man I know told me often that he never experienced difficulty. And I found that his carriage had been laid up a week because his pumps did not work. Another, who constantly bragged to me that he was running all right, has had rims broken on the wheels, broken crank shafts, ruined clutches, and performed other feats. Still he smilingly says he doesn't have trouble. He likes such things.

I haven't sufficient knowledge of mechanical matters to assert that all the difficulties met with by automobilists could be eliminated if the makers really did their best. I am personally acquainted with some of the leading builders, and they tell me that so far as their light goes they are actually trying to build as good machines as they can construct within certain limits of cost. Most of them say they are not making any money, for experimenting costs so much. If the makers are sincere, how can we users expect to see the time when our dream of simply pulling a lever and then gliding along for hours without a care will be realized?

And yet I think the makers have good grounds for complaining that they cannot build fool-proof machines and that a good many of the troubles complained of are caused by ignorance and inattention. As an example of this sort of thing I recall a place where I stopped for a few minutes the other day, when a professional driver came in with a fine carriage, and complained that the clutches would not hold. He did not know where the clutches were located, however, and I guess he would not have known what the difficulty was if someone had not told him. Anyway, he put on his working clothes and commenced to strip the carriage. He had it pretty well taken apart when a man who was acquainted with the machine came along and pointed out the location of the missing clutches. A few turns with a wrench fixed them right. The man in charge of the carriage said things and was profuse in condemning the whole affair, because he thought it was complicated and unreliable. And so on.

PATIENCE AND PERSEVERANCE.

My observation leads me to believe that any of the better class of automobiles will run long distances if properly cared for and repaired when necessary. This may require a complete new set of machinery, but if things are looked after by men who understand them the carriages can be pushed along over almost any roads. It is the necessity of using constant care that has made men like Reggie Vanderbilt give up his trips so often, and others have failed in getting through for the same cause. They lacked either patience or perseverance. Both are handy things for automobilists to carry along on a tour.

It having been established that an automobile can be made to run without a single stop for at least 100 miles, there certainly should be encouragement in sight for those who are paying for the carriages. Still, even though a machine will stand up wonderfully well for many miles, it will also go to pieces any time, when perhaps it is wanted the most. Then the skilled operator comes in and makes necessary adjustments and repairs, and the wheels turn again. But the aforesaid skilled operator will probably spoil his gloves, wreck his clothing and waste much time. Yet such an operator can get along. But he must have trouble. That's the tune I sing, not from choice, however. ROBIN DAMON.

A Bit of Police Stupidity

Editor HORSELESS AGE:

The Bronx Automobile Club indulged in a club run Saturday from 138th street and Mott avenue to Hunter's Island Inn. The committee having in charge the preparations for the run was advised that it might be necessary to obtain a permit from the police department, and accordingly the captain of the precinct was approached and he advised the committee to visit headquarters. A member then proceeded to the sacred domains in Mott street and sought the "information bureau," where he informed the "easy possessors" his wants and was told that no permit was required. inasmuch as the machines would not be going double file. The humble petitioner then meekly departed, with a feeling of mingled awe and gratification. The gratification is already accounted for—the awe was inspired by the encounter with the lion in his den, in this case the supposititious "servant of the people" in his headquarters.

The run was booked to start at 1:30. At 1 the members of the club and their guests beheld two lowly members of the "finest" approaching, and a feeling of satisfaction o'erspread the assembly as we mentally noted that we were to have our interests looked after and be protected from the annoyances emanating from the hoodlums who infest our streets at all times unmolested by the police. We were a group of gentlemen, all taxpayers, who are constantly menaced by hordes of the vicious and subject to their acerbity and invectives, which example is taken up by the children, who in their turn add liberally to our cup of gall.

The cops approached the nearest of our group and remarked: "Yuse fellers will have to put a stop to this club run because yuse have no permit."

"By whose authority?" was asked.

"They telephoned up from headquarters about a half hour ago to put a stop to it."

(The first member had not arrived with his machine at that time.)

Then it came our turn to talk, and we did it: but the minions of the law (?) remained obdurate.

To make a long story short, we were forced to remove our badges and hide our American flag, which the pacemaker had raised as a standard, and start away one at a time at the dictation of the before mentioned minions, who allowed the previous wagon to just emerge from sight behind the brow of the hill beyond.

By a preconcerted arrangement we con-

gregated at Cedar Park, just out of sight of our starting point, where we formed in line and proceeded without further molestation to Pelham Park, where an agreeable lunch awaited us at Hunter's Island Inn.

We returned to the city again in line, and at our starting point indulged in a debate as to whom we had failed to "see"; but after due deliberation the question was laid on the table for future consideration.

The club is young, and therefore we are frank to admit that we had not "seen" anybody. It really had not occurred to us. In the future we will "see." But again will come the query, whom shall we "see"?

Can any of the readers of THE HORSELESS AGE advise us?

AUTO MO. BILL.

The Winter Demand.

Editor HORSELESS AGE:

A thought worthy of your attention is the education of the public regarding the use of vehicles all year around. Most users put up their vehicles in the winter time, which is not the thing to do. If they are to take the place of the horse and carriage they must be usable continuously.

Second, manufacturers should be advised to vary their prices according to the demand, so as to keep their factories going during the fall and winter as well as during the spring and summer, and it is our intention to make some concessions to buyers during this season of the year hereafter in order to make more sales during the fall and winter.

We further expect to have our next year's designs ready within the next two months, so that anyone buying this fall will have a next year carriage and need not wait till spring on this account.

DURYEA POWER COMPANY,
By C. E. Duryea.

Broken Axles.

CLEVELAND, Ohio, July 26.

Editor HORSELESS AGE:

Having noticed a number of broken axles on machines of various types, both heavy and light, the question is suggested whether the design is too light or whether there are other causes of failure. One machine I have in mind specially had a split shaft, which depended entirely upon the shell of the differential for support. It broke midway between the rear bearing and differential. No distance bars, trusses, or hollow sleeves were used to reinforce the shaft. Although it was very heavy in proportion to the weight it had to carry, it crystallized and broke previously from the effects of vibration.

Other axles have broken between the wheel and bearing, but these were evidently too light. Too much attention cannot be given to the proper proportioning of axles for the weight they have to carry and for the roads over which they are to run; and, secondly, the axles should be so braced, trussed or reinforced by sleeves that the crystallizing effect of the vibrations may be reduced to a minimum, thus avoiding inopportune and expensive breakdowns.

G. S. H.

A Rather Expensive Initial Run.

BROOKLYN, N. Y., July 26.

Editor HORSELESS AGE:

The writer started out with a companion on last Friday with a 6 horse power gasoline machine for a trip to Baldwin, L. I. The start was made at 8:30 p. m. from the centre of Brooklyn. Nothing developed the first few blocks, the motor starting easily on a quarter turn of the crank. At the end of the fifth block a flat tire was noticed on the lefthand front wheel, although the tires were in perfect condition when the start was made. An investigation showed an inch nail straight in the thread of the tire. A brief stop at a bicycle repair shop and an expenditure of 25 cents remedied the fault. Another start being made, the high speed clutch was thrown in, nothing going wrong for the next 16 miles. This brought us into Springfield on the Merrick road, where for some unknown reason the differential suddenly refused to "differentiate." This happened on a curve, and before the wagon could be stopped the lefthand rear tire was torn off into pieces about 4 inches long. Perhaps it would be well to say here the wagon drives by means of a countershaft and a chain running back to each rear wheel. It is provided with a hill climbing and high speed device, together with a reverse, and weighs a little over 1,000 pounds.

This mishap was no obstacle to us, as we were determined to reach our destination with the wagon if we had to push it. A visit to a nearby farmhouse resulted in about 30 feet of "hay wire" with which the remains of the unfortunate tire were firmly lashed to the rim. The differential was then investigated and it was discovered that a large nut had worked off and become lodged in the gears. The nut was removed, returned to its original position, and the journey again commenced. After going about half a mile the motor suddenly stopped, and half an hour's investigating finally located a broken wire. After splicing this up, we proceeded about two miles further, when the differential again stuck, this time throwing of the chain. The same nut was discovered to be loose, and again replaced. Nothing happened for the next four miles, when the differential again jammed. This time the trouble could not be located, as the nut seemed to be in place and the light was very poor. The only remedy appeared to be to remove one side chain and drive with the other. This was done, and the $\frac{3}{8}$ side chain on the left drove us the remaining $3\frac{1}{2}$ miles.

This was necessarily done on the low speed, and we arrived at our destination at 2:30 a. m. To crown our difficulties friends, who had gone to bed by this time, having given us up, came out with two bulldogs and a shotgun, thinking we were burglars. We were too tired to do anything with the wagon and so left it in the street until morning, when we discovered a crowd of farmers about it speculating on the cause of the runaway and what had become of the passengers.

The trip may be summed up as follows:

Time consumed from Brooklyn to Baldwin, 6 hours.

Time for same distance on railroad, 55 minutes.

Expense of repairing puncture, new tire and labor done on the differential to repair it next day, $15.

Expense of gasoline, 20 cents.

Total expense, $15.20.

Car fare for same distance, 60 cents.

This may not seem very promising, but it was the writer's first trip with the wagon, and he is expecting better luck next time.

It is only fair to say that, barring the broken wire, the motive power gave no trouble at all, the engine running evenly and smoothly for the entire distance.

After this experience, the writer is inclined to favor solid tires, and would like to know what objections, if any, can be advanced against them.

THOMAS HALL WYATT.

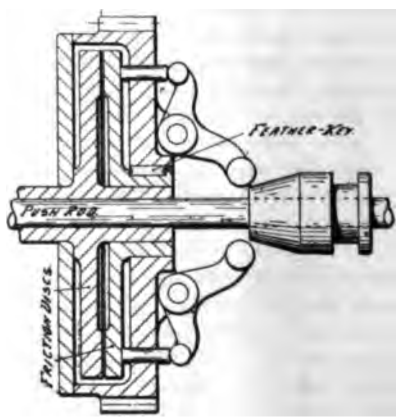
Miscellaneous Questions.

Editor HORSELESS AGE:

In your Communications column, issue of July 16, a party states that the lift of a $1\frac{3}{4}$ inch valve should be $\frac{1}{4}$ inch. Should not the lift, to get the full efficiency of the valve, in this case be 7-16 inch or about one-quarter of the diameter of the valve, and is it not customary to make the inlet valve slightly larger than the exhaust valve?

On the Beginners Page the conical band and block clutches were described, but was not a very important type of clutch left out, namely, the compression type, such as is employed by a number of prominent makers?

The following is a sketch:



What is the usual gear reduction for a bevel gear drive at rear axle (direct drive on high speed) with the general type high speed motor? What are the cylinder dimensions of the Winton touring car mo-

Also of the 8 horse power De Dion ?

it is the tensile strength and safe ıg and torsional stresses of Mag- Are there any foundries in the States where such castings may be d? SUBSCRIBER.

e-quarter of an inch lift is insuffi- or an exhaust valve of 1¾ inches er. A lift of ⅜ to 7-16 inch will be as long as the parts and the core nding the valve plate are properly ed and proportioned. Inlet valves automatic type should have a lift o 5-16 inch. If these valves are me- ally operated they may have a lift. Inlet valves are usually made y larger than exhaust valves, one being that the guide (through the valve stem passes) and its wings wn the free area of the passage of In the case of the exhaust gases ifference in pressure between the er and the atmosphere is almost atmospheres. When the charge is drawn in, on the other hand, there artial vacuum in the cylinder and tmospheric pressure back of the . Hence, for this reason, too, the sion valve should be larger. If the st valve however, is more than am- e valves may be made of the same

s not possible to describe even all pes of clutches or other parts made en the prominent manufacturers in lumns of the Beginners Page. We that any of our readers who have lly read what was printed in those ns on the subject of clutches will r understand the operation of the which you have sketched.

cannot say whether there are foun- that cast Magnolia. The alloy is used in connection with flying ma- motors built in France. Perhaps of our readers can give you the de- information, in regard to its proper-

bore and stroke of the Winton ıg car motor are 5 and 6 inches re- vely; the de Dion 8 horse power is 5x5 inches. A reduction 5½ to 1 e about right for a direct high gear high speed motor and 28 to 30 inch s.—ED.]

Dr. Hutchinson's Letter.

HORSELESS AGE:

Hutchinson's remarks on the reach- steam carriage contains in a few some very important points ap- le to gasoline carriages as well, and ry truly places reliability first, sim- second and accessibility third, after economy is a much less important r. The tendency of all new things m the complex form to the simple, many people are not satisfied unless have everything on the motor vehi- at the market offers, both luxuries necessities. The more experienced users, however, arrive at the doctor's conclusion, and if the inexperienced buyers were willing to be advised by an old hand like the doctor, progress toward reliability, simplicity, which greatly contributes toward accessibility, and low first cost would be more rapid. The doctor's statement that "absolutely all automatic devices are to be omitted" covers the ground fully, for such is the decision in ordinary stationary engine practice. The automatic device is all right so long as it works, but when it fails, and all devices do fail occasionally, then there is trouble. The thought should be to make the device as simple as possible so that it will need but little watching, and then let the operator do the watching. Motor vehicles must be made so simple, so reliable and so manageable that ladies and children may handle them with certainty and safety, and this they are destined to become in the next few years.

CHARLES E. DURYEA.

Wheels of the Renault Racer.

Editor HORSELESS AGE:

On page 65 of your issue of July 16 F. G. Mott, Jr., asks a question. Renault, the winner, used wood wheels. Mr. Mott has evidently been looking at a Renault catalogue instead of at the photos of the machines used in the race. E. T. B.

[Mr. Mott was mistaken in regard to the wheels of the Renault machine in the Paris-Vienna race. In an account of the event it was stated that a contestant crashed into one of Renault's wheels and that the latter had to make new spokes out of wood which he found by the way. —ED.]

Explosive Motor Queries.

Editor HORSELESS AGE:

In an article on piston rings in gas engine construction by J. Edward Baldwin, issue of June 11, a formula for piston rings is given (page 698) which does not work out right. The formula given is as follows: The thin part of ring = the thick part x 5 ÷ 3. Would you please correct the same?

What thickness should the cylinder walls of a gasoline engine of the following dimensions have: Diameter of cylinder, 3¾ inches; stroke, 4½ inches; revolutions per minute, 700. What horse power should an engine of the above dimensions develop? What scale is the drawing of carburetor on Beginners Page (issue of June 4, page 685, Fig. 2)? J. H.

[You are right in regard to the formula $F = \frac{5T}{3}$; it should read $F = \frac{3T}{5}$. If T, the thickest part of the piston ring, is equal to 9-64 inch, then F, according to the corrected formula, will figure out equal to .084 inch, which is, practically, equivalent to 3-32 inch.

Provided you can get good castings you may make the walls of the cylinder of your engine ¼ inch thick. In case you force a liner into the jacket casting, ¾ inch is sufficient.

A well proportioned and well built four cycle engine of the dimensions you give, and running at 700 revolutions per minute, should develop about 3⅛ horse power and about 4½ horse power at 1,000 revolutions, to which speed you may speed it up by opening the throttle and advancing the spark.

Fig. 2 on page 685 is a reprint. We can, therefore, not give you the exact scale. The cut illustrates the well known Longuemare carburetor, which is now being manufactured in this country.—ED.]

Practical Suggestions in the Care and Design of Steam Carriages.

Editor HORSELESS AGE:

If you will permit an humble repair man to write a little on the automobile subject I will try to say something which may be of use to owners of automobiles.

If some of the steam carriage owners would familiarize themselves a little more with their machines they would hardly have so much trouble.

At page 688 Robin Damon writes of troubles "his friend" had with a steam carriage. Very likely in getting out of his machine he knocked the throttle open, or it may have been leaking. A plate put on the side of seat, with a notch in it, into which the throttle lever could be sprung on stopping, would stop this kind of accident. These plates should be put on by the builders.

As to getting on the centre with a two cylinder steam engine of the type used in automobiles, it is not possible, unless something is broken. He may have let his steam run down enough to make it appear that his engine was on the centre in attempting to move it.

I would never attempt to run a steam carriage without taking the checks out of the water pipes leading to the glass; it is better to spoil a little paint than to burn a boiler. On the other hand, Robin Damon says the driver noticed the water did not rise or fall in the glass, which lays the blame for the burnt boiler on the driver. By taking the checks out of the water glass the pipes can very readily be blown out, which should be done pretty often, if the water is not of the best. By disconnecting the pipes from the lower head of the boiler and the steam pipe from the top head, and pulling the nozzle down in the boiler and then turning on the water pressure, a great deal of mud, etc., can be washed out. I recently took a fire tube boiler out of a carriage which had been in use three years and found mud in it from 1 to 6 inches in depth.

If the man who becomes the owner of a steam carriage will try to learn the different parts of his machine, inspect it properly and keep oil in the proper places, he will

be surprised how much pleasure may be gotten out of automobile riding.

The valves and cylinders should be properly lubricated, as a dry valve and cylinder take more steam than they otherwise would, and more steam means more gasoline, etc. A great many steam carriages have a rubber exhaust pipe connection between engine and muffler. This will become rotten and swell, causing a back pressure on the engine which is also hard on the fuel bill.

The use of too much cylinder oil will cause the exhaust passage to become clogged enough to make back pressure. A little graphite on the crosshead guides will go far toward preventing the cutting of the guides.

Or small cups put on so they will give a steady supply of oil to the guides will save trouble some time or other. The reverse lever should have a quadrant with notches in it, so that the links may be hooked up, so that the valves will cut off at about one-third stroke on good roads. It saves steam and will take the carriage along at a good gait.

There is a gentleman in my city who has run one carriage 1,600 miles, and I have never made any adjustment about his engine other than to pack the piston rods and valve stems. Of course, I have cleaned out his generator, washed out the boiler, cleaned flues, burner, etc. In two years' use of steam carriages he has never burned out a boiler or been hauled home, nor has he had an accident, although he is an office man and no mechanic. I give this to show what can be done when one will try.

Repair men are to blame for a great deal of trouble because of their inexperience and careless work.

The reverse lever should by all means have a notched quadrant to hold it in place, as an engine will not stay reversed if the lever is free to move of itself—that is, if a carriage is moving forward and the engine is reversed, it will reverse itself back to forward motion again unless the lever is held to its place. Take the case of a locomotive running at a fair rate of speed forward and then reversed. It becomes a large air pump, taking air in through the exhaust pipe and forcing it back through the steam pipe past the throttle to the boiler.

If the reverse lever should be unlatched while the locomotive was still moving forward in its reversed condition, the lever would move to the forward motion again of its own accord, and the engine would jump forward, receiving its impulse from the air which it had pumped into the steam pipe while running forward in reverse motion. The same thing happens in an automobile engine. E. J. Valentine.

Backward Down Hill.

Editor Horseless Age:

I have read with interest the communication of Walter K. Shaw in your issue of July 16. I have had the same experience with my carriage going down hill backward by the reversing of the lever. My experience is that the reversing of the lever is not the only condition under which a carriage will go down hill backward.

About a week ago, as I was climbing an unusually bad road and very steep, I got half way up the hill and stopped; then I turned the steam on the go ahead engine while the reverse lever remained fixed on this engine. There were 200 pounds of steam on, yet I went down the hill backward with the above pressure of steam on the go ahead engine the entire distance.

I have tried the experiment quite a number of times of starting my car backward down a hill and then turning the steam on, and in every case I have found that my cart would continue to go down the hill with the steam on the go ahead engine. A friend of mine has tried the same experiment with the same result.

I have never been able to exactly explain it, except possibly the valve has too much lead. H. M. Jones.

Motor Bicycles.

Editor Horseless Age:

I was very much amused at Mr. Bramwell's report of the motor bicycle endurance contest. Mr. Bramwell is undoubtedly prejudiced against motor bicycles. He tries to be funny by saying that parts of the electrical arrangements were located here, there and everywhere. I will ask Mr. Bramwell are all the electrical arrangements on an automobile located in one particular spot? I guess not.

In regard to being able to hear the exhaust from six to eight blocks, will say that I have got a motor bike from which you can hear no exhaust 100 feet away, and I don't think that I am the only one that has got a muffler that does the work to perfection. I know of several makes of motor bikes that are almost noiseless in operation.

I have run my machine now for one year and with the exception of the first month after receiving it I have had no trouble to speak of. Of course, they are not proof against breaking of wires that connect the batteries, dirty spark points or grease on the controller point, but with a little common sense they are as reliable as an eight day clock. On the start, before I had learned to operate it, I had almost as much trouble with it as Mr. Damon has with his automobiles, but I have never had to call for help to get home, or lie in the mud to fix some part of the machine, as do some of our brethren who own automobiles. I have yet to hear a complaint from a man that owns a motor bike about it being a failure, which cannot be said with regard to automobiles. I don't mean to say that automobiles are a failure as far as running is concerned, but I do say that a motor bike is a thousand times more reliable in its workings, and will be pretty sure to take you there and bring you back.

Mr. Bramwell says that the electrical parts were of too small capacity. What does he mean by too small capacity? If he has reference to the carbureter, will say that they are generally made to fit the engine. Surely he doesn't think that a 2 horse power motor requires the same size carburetor as a 50 horse power motor; and as for the spark coil and battery, most motor bikes use four cells of ordinary dry battery and about the same size coil as is used on automobiles. Of course, some coils are put up in different shape. I know of several automobiles that use the same kind of coil that I have on my machine. One point that I admit is that on an automobile they can carry an extra set of batteries and work from one to the other, which is not practical on a motor bike, on account of the extra weight and bulk. Outside of that the electrical workings are almost identical, so that I fail to see where Mr. Bramwell has scored a point.

I do not claim to be able to do what W. J. Bartholomew says Mr. Caffman is doing on his trans-continental trip. I would like to see the man that can run over 23 miles an hour for ten hours straight on rough country roads, which he would have to do to make 237 miles in one day's run. Perhaps he calls twenty-four hours a day, but if he can stay with a motor bike or any other bike for over ten hours at a stretch and maintain a high rate of speed he is "a bird." In making a trip from Portland to Denver I think it will be found that the road is not paved all the way. Mr. Caffman has filled Mr. Bartholomew with what the boys call balloon fluid. C. Culver.

[That motor bicycles are more reliable, or surer "to take you there and bring you back" than automobiles, as claimed by our correspondent, is not borne out by the results of contests. In the New York-Buffalo endurance contest none of the starters in the motor bicycle class arrived at the terminal control, Rochester, within control time, and in foreign racing events the percentage of arrivals is usually the lowest in the motor cycle class. This is, moreover, what would be expected and not in any way prejudicial to the motor bicycle. The much higher price of a regular automobile entitles the purchaser to a vehicle of both greater comfort and greater reliability, and the designer of the automobile is able to provide greater reliability as he is less restricted by considerations of weight and cost.—Ed.]

The Pittsburg *Times* calls attention to the fact that in spite of the large number of automobiles in the city fewer accidents attributable to this cause can be debited to Pittsburg than to any other city of the first class in the country. Only one death due to an automobile has so far been reported there, although several runaways have occurred in the suburbs.

...OUR... IGN EXCHANGES

he Wolseley Racer.

ompanying half tone is an illus- the three cylinder 45 horse power of the Wolseley Tool and Motor Birmingham, England, which e one of the contestants in the nna race. Owing to the inabil- A. C. F. to get permission from and Austrian authorities to hold until just before the event, the as not completed in time to give road test before the race, and the cided not to start.

e standpoint of the engineer this ered machine is one of the most vehicles built for the contest. of gravity is certainly lower than y of the other automobiles en- its wheel base is extremely long. axle is straight—i. e., it is not of ed type, to which those of most ars belong. The most striking the frame, that is to say, the way nded. The springs are bolted to from below and the frame is be- springs instead of above both. good feature, though a car built lines would not be suited for purposes in a country like our re the roads are bad and many es or small boulders are apt to ntered. In the far West, where ehicles are fitted with extremely ls, this system of suspending the y some day be employed in con- ith automobiles that are to run heels. The axles may be straight machine and located higher up body.

y to the conventional French his representative of the English icle industry has a three cylinder a four cylinder engine, and the ft is parallel with the axles in- being located at right angles to lthough each driving wheel has dual chain, no bevel gears are used or required. The power from the engine is transmitted by a chain, as is the Wolseley practice. Part of the body is below the frame and all running parts are completely enclosed below, so that dust can only reach the bearings from above. The motor, which has a hood below it instead of over it, is always in sight of the operator and almost completely exposed to view.

To build the machines within the specified weight limit, strength was sacrificed in many parts. The two Wolseley 30 horse power four cylinder cars broke their crank shafts and were then hors de combat.

The reasons for the failure of many other contestants to put in an appearance at the goal may never be known.

45 Horse Power Wolseley Racer.

Motor Vehicles for Public Service.

The *Automotor Journal*, London, reports that the Glasgow Corporation Cleansing Department has secured, at a cost of £585, for the removal of dust and street refuse, a Milnes wagon, fitted with Kelly's patent tipping arrangement, and capable of dealing with 3 to 4 tons each round. The Bootle sanitary committee is also substituting motor traction for the same purpose, and has decided to purchase two steam wagons at a cost of £672 and £835. Each will be capable of carrying 5 tons, will have a sweeping apparatus attached, and be convertible for watering the streets when required. A loan of £1,552 is to be obtained from the Local Government Board for making the purchases.

On another page of the same issue of our contemporary is an account of a test made with a Fischer gasoline electric omnibus. The vehicle is one of a number that will be in use on the streets of London, England. Our readers are acquainted with this type of vehicle, which is built at Hoboken, N. J. The account of the run is as follows:

"A run was recently made with a sample 'bus from London to Woking and back, including various side trips, making a total outward run of 41 miles and a return trip of 32 miles. The former journey occupied 4 hours and 39 minutes, including 44 minutes for stoppages, and the fuel consumption was 5 gallons. Coming back the time taken was 4 hours and 35 minutes, including 27 minutes' stop, and the petrol consumption was 6 gallons. The passengers included some of the directors of the London Road Car Company, besides others interested in witnessing the capabilities of the machine. On an average eleven passengers were carried, and for part of the journey there were thirteen. The run appears to have been a complete success, and, as will be seen from the following brief mention of the road traversed, parts of the way were anything but level. Leaving London the following route was traveled over: Putney, Kingston, Sandown Park, Walton Station, Woking, Ripley, Ockham, the "Hautboy," Esher, Kingston, Putney and London. It will be noticed that the average speed works out about 9 miles an hour, and the consumption at about 1 1-5 pint per mile."

Negotiations between the Fischer Motor Vehicle Company and the London General Omnibus Company, as well as the Road Car Company, are under way at present. It is surprising, indeed, that these corporations should turn to the United States for their equipment.

Motor Trucks in the Congo Free State.

The Belgian Government has decided to operate a motor truck in the Congo Free State between Songololo and Kwango. Alcohol is to be the fuel. The weight of the machine is 7,200 pounds and the net load is to be 4,400 pounds. The truck is to cover a mile in less than eight minutes, or to run at the rate of a little over 7.5 miles per hour. The consumption of fuel per 5 gross tons may not exceed .42 gallon per mile, or but 8.28 gallons per ton per 100 miles, certainly a low maximum consumption. The wagon is to make a round trip once a week and carry a load going and coming.

The officials have tested the truck and it has been accepted. It is to be hoped that the roads will be put into such a condition that the vehicle may accomplish its task successfully, so that the unfortunate experience of French capitalists who sent good vehicles to Africa may not be repeated.

M. Werheim, a French automobilist, purposes to make a record between Paris and Turin. The distance of just 600 miles is to be covered at the rate of 31.2 miles per hour.

Prince Ferdinand of Savoy is about to make an extended tour with the Panhard of M. Tonietti. The entire royal Italian family is devoted to the automobile. The Queen's mother may be seen almost daily on a drive in the neighborhood of Turin.

Another Long Distance Race.

Under the auspices of the Automobile Club of Namur and Luxemburg and the Automobile Club of Belgium a race is to be held on August 31, which is to be

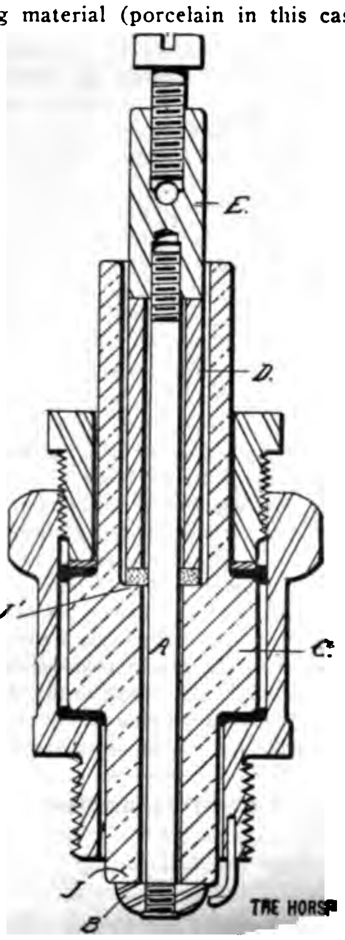
called the Circuit des Ardennes, and is named after a range of mountains in Luxemburg. The course is through the forest from Bastogne to Martelange and back by another route. The round trip is approximately 53 miles and it must be covered six times by each competitor. The total distance is, therefore, 318 miles. The course is not laid out through villages or hamlets, and since the roads are good and there are no steep grades fast time may be made without much endangering life. Controls are to be established at Bastogne and at Martelange only.

Four classes have been established, viz.; First, 2,200 pounds, carrying operator and assistant; second, 1,540 pounds or less, carrying two occupants; third, 880 pounds or less, carrying one or two occupants; fourth, touring cars, weighing less than 2,200 pounds, with four passengers, inclusive of the operator.

The prizes consist of gold and silver medals and there will also be money prizes, ranging between 75 and 1,000 francs. Edge, Jarrott, Jenatz and Dechamps are among the entries. It is expected also that a number of the unsuccessful participants in the Paris-Vienna event will start.

Bezille's Compensating Spark Plug.

The accompanying line cut illustrates a new jump spark plug which has been brought out by M. Bézille, of Moulins-Engelbert (Nievre, France). In this plug allowance is made for the unequal expansion of the rod electrode and the insulating material (porcelain in this case).



In the engraving A is the rod, B its head, C the porcelain insulator, D the copper tube, and E the brass terminal for the ungrounded wire.

When the motor is running A absorbs heat and expands. If no provision is made for this expansion B will leave its seat and the tightness of the joints J and J[1] will be impaired. In this plug a copper tube of suitable length is inserted as shown. Heat from the rod A and the porcelain C is transmitted to the tube D, which expands the same amount as the rod has expanded. The principle of the compensating pendulum has been applied here to the jump spark plug.

Alcohol in Belgium.

The Count de Villegas de Saint-Pierre, secretary of the Automobile Club of Belgium, intends to take part in the Circuit des Ardennes (a race which the club is to hold shortly) and will operate a machine propelled by alcohol. He has asked the Belgian Minister of Finances to permit the importation free of duty of 1,000 litres of carburetted French alcohol, which is to be used as fuel by all those contestants who have signified their intention of using alcohol instead of gasoline in the contest. There is no doubt that if importation is not permitted M. de Villegas will obtain authorization to manufacture the denaturized alcohol under the supervision of the revenue officials.

The Belgian Government has granted permission to manufacture denaturized alcohol to three Belgian automobile manufacturers, the officials of the Congo Free State and to a society that is experimenting with alcohol as a fuel for heating and illuminating purposes. Nobody in Belgium feels warranted in hoping that the use of alcohol in explosion motors will ever become universal there, because the government will not abolish the tax on it. —*La France Automobile.*

A Nut Locking Device.

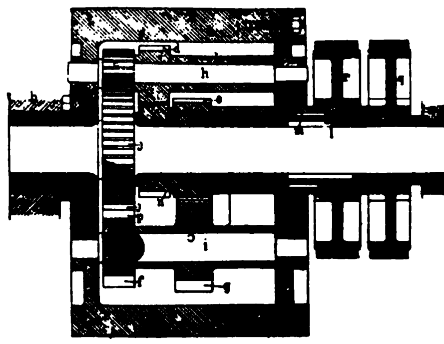
The accompanying engraving illustrates the rotary pump of J. Julien, 129 Rue Saint Marie, Paris, France. The most interesting feature of this pump is the bent

steel spring, which is secured to the pump body by the same nuts that bind the flanges of the body together. The spring presses against one of the flats of the nut which presses the gland in the stuffing against the packing, and thus prevents the nut from coming loose. When tightening up the nut it is necessary to turn it 60° or a multiple of that amount.

A French Planetary Change and Reserve Gear.

The line cut which accompanies this description illustrates a variable speed gear which, while applicable to automobiles in a general way, is intended mainly for use on gasoline launches.

The device is shown in longitudinal section and is mounted on an extension of the crank shaft of the motor. *a* is the flywheel of the motor, which has been given a great width of face, so that all the gears and pinion shafts may be enclosed; *b* is a sleeve which carries the whole device; *c*,



d, *f* and *g* are the pinions, and *j*, *n* and *o* are the master gears; *k* is the shaft that transmits the power to the rear wheels, *r* and *q* are pulleys that serve the same purpose that the individual drums of American planetary speed gears serve. The gear *j* is keyed to the shaft *k* and engages with pinion *c*, which is an integral part of the shaft *h*. The hubs of the gears *o* and *n* are extended and the pulleys *r* and *q* are keyed to them, respectively. The pinions *d* and *n* engage with each other, as do *g* and *o*. Pinion *f* does not engage directly with the gear *j*, but indirectly, through the agency of the pinion *p*, a relation between the gears is established. The pinion *f* and the shaft *i* are turned up out of a piece of solid stock. Bronze bearing sleeves are inserted between *k*, *l* and *m*—i. e., they are forced into the gears *n* and *o* and extend to the extreme ends of the hubs. Brake bands embrace the pulleys *r* and *q*. If the band of the former is applied *o* ceases to revolve, the pinion *g* is obliged to revolve around its own axis, and so is *f* in the same direction of motion. The result is that *j* and *k* revolve in the opposite direction to the engine's crank shaft. When the brake band of *q* is applied *n* ceases to turn, *d*, *h* and *c* revolve around their axes and *j* is driven in the same direction as the crank shaft, but at a reduced speed. The brake bands are never applied at the same time, but alternatively, of course. When both brake bands are relieved the shaft *k* comes to rest. Consequently there is but one speed forward, no free drive and a reverse motion.—*La France Automobile.*

r automobile club, called L'Auto ıtique, has been formed at Nice.

ding to *La Locomotion* there are o motor vehicles in use at Beirut,

Motor Manufacturing Company, capital £80,000, has recently been d in England.

Crowdus, the storage battery in- of Chicago, Ill., is again in Lon- . a new electric vehicle.

wiss military authorities have al- ,000 for the purchase of an auto- o serve for the instruction of the

merican Consul at Valetta, Isle of ; of the opinion that a motor om- vice would prove a good business at that place.

ritish embassador to China, it is ., has called the attention of Eng- ıufacturers to the opportunities for ing motor trucks into that coun-

pp & Co., of Bielefeld, Germany, ivered their first omnibus to a cor- . which is to operate a line be- Iagdeburg and Ottersleben (Ger-

Cycle Dealers' League of Germany le arrangements for an exhibition mobiles at Hamburg during the October 3 to 12. Whether foreign will be asked to exhibit we are not l.

hilippe Richmond, according to *motion Automobile,* left Paris the day after the races had started, at and arrived at Vienna the follow- day evening in a 12 horse power arriage.

is to be an exposition at Athens, under the patronage of H. R. H. ıcess Sophie. The exhibition will ce on October 15. In the trans- n building space is reserved for iles and motor cycle exhibits.

e Paris-Vienna race most of the hat made a good showing were d with "Continental" pneumatics oyal" radiators. The Gobron-Na- soline car was the only machine ıting in the event with its engine e body.

Edge and Montague Napier, the ıd designer respectively of the Gor- ınett Napier vehicle, were to be the of the Automobile Club of Great and Ireland at a dinner at the ll Rooms, Hotel Metropole, Lon- Wednesday, July 23, in recognition of the success in the Gordon Bennett race.

At the recent convention of the Society of the Chemical Industry at Liverpool the Liverpool Self-Propelled Traffic Association provided automobiles with an aggregate of sixty seats to convey the delegates to the Widnes Chemical Works of the United Alkali Company, Limited.

The Motor Bicycle Union of Ireland has decided to hold an informal hill climb. No prizes are to be given, the object being rather to give the members an idea of the capabilities of the different machines which they are using. The test was to take place early this month.

As a remedy for burns the *Motor Car Journal* suggests picric acid in a strong aqueous solution. "This at once removes pain and to a great extent prevents blisters, at the expense merely of dyeing the affected part for several days of a color that will probably match the wheels of the car."

The last hope of automobile racing of any sort in England seems doomed by the action of Mr. Justice Farwell on July 24, in enjoining Earl de la Warr from allowing races on his private track at Bexhill-on-Sea, Sussex, where one successful meet of the Automobile Club had already been held.

In Madrid, Spain, all automobilists must secure a municipal license and must equip their machines with two number plates, one in front, the other in the rear. A speed of only 5 miles per hour is allowed in the city limits. Professional operators must pass an examination to secure a license.

Another automobilist, J. W. Stocks, has just completed the "end to end run" (Land's End to John o' Groat's in Great Britain) with an 8 horse power De Dion machine. He made the 888 miles in 2 days, 14 hours, 25 minutes, or at an average speed, including all stoppages, of 14.2 miles an hour.

The international committee which was in charge of the Gordon Bennett cup race, of which Mr. Johnston is the representative of the A. C. G. B. and I., and the Count de Chasseloup-Loubat the representative of the A. C. F., has awarded the prize to S. F. Edge. The A. C. G. B. and I. has now become the custodian of the cup.

Although only a small thing, it often causes great annoyance and delay to find, when a plug breaks down and a new one has to be fitted, that the spare plug has no washer, particularly as it is often a matter of difficulty, and occasionally an impossibility, to get the washer off the old plug. We know that these washers can be bought at most motor depots separately, but all these separate things give unnecessary trouble, and it would be much better if an absolutely regular practice were made of sending out every plug fitted with its washer, the more so as the plug is practically useless without this necessary adjunct.—*The Autocar.*

A. J. Balfour, the new English premier, has joined the ranks of the automobilists by purchasing a 9 horse power Napier tonneau and becoming a member of the A. C. G. B. and I. Lord Salisbury, it is said, has retired his tricycle and taken up the automobile. He recently purchased a locomobile and has become quite an enthusiastic motorist.

On the occasion of the recent tour which was held under the auspices of the Mittelenropäischer Motorwagen Verein (the Automobile Club of Germany) the prefect of the province Perleberg instructed the police to throw obstructions in the way of every participant who exceeded the legal speed limit. He also called on the populace to assist the police authorities in this work.

The new British Prime Minister a short time ago left the House in an automobile, and after a while noticed a cyclist hanging on for all he was worth. "Shall we pace you?" inquired Mr. Balfour, genially. No answer was vouchsafed, but when two constables pulled up the vehicle the energetic cyclist proved to be a policeman taking records of the speed of the distinguished pacemaker.

The National Automobile Federation of France, which is composed of automobile designers, operators and mechanics, held its third national congress on the 18th, 19th and 20th of this month at the Bourse Central du Travail (Central Trades Exchange) in Paris. Manufacturers were invited to send representatives to participate in the discussion of matters of interest to automobilists.

At a recent meeting of the French Society for the Encouragement of National Industry the Minister of Marine announced that, following the recommendation made at the congress held at Zurich in October, 1900, as to the adoption of an international system of screw gauges, he had, with the concurrence of his technical advisers, decided to render the new system a service regulation so far as it concerned the heads and worms of screws. He had accordingly given instructions that for all sizes used in the French navy the length should be made equal to 1.4 diameter plus 4 millimetres ($L = 1.4d. + 4$ mm.); so that from any one part every bolt could be distinguished at first sight from the bolts of other dimensions, either by the head or by the body of the screw; and that, leaving out exceptional cases, the sizes should be determined by the above simple formula.

List of Registered Automobile Owners in Cleveland, Ohio.

C. E. Burke, 813 Prospect street.
J. J. Tracy, Jr., 309 Euclid avenue.
B. K. Diebolt, 174 Outhwaite avenue.
F. I. Harding, 47 Windsor avenue.
O. S. Lautermilch, 617 Denison avenue.
W. H. Wherry, East Cleveland.
W. F. Staniforth, 684 Central avenue.
J. P. Johnson, Mayfield Heights.
Joseph Schauweker, 56 Crawford road.
Joseph L. Allen, 821 Willson avenue.
H. Pomeroy, 116 Ingleside avenue.
H. P. Dyer, 557 Hough avenue.
J. T. Dickson, 10 Plymouth street.
C. O. Simmons, 122 Baldwin avenue.
H. S. Pickands, Euclid, Ohio.
Ralph Worthington, 1099 Euclid avenue.
George S. Gynn, 2192 Willson avenue.
L. A. Sholes, 28 Cheshire street.
The American Motor Carriage Company, 514 East Prospect street.
E. D. Shurmer, 1048 Willson avenue.
Addison H. Hough, 804 Case avenue.
H. G. Otis, 794 Euclid avenue.
H. S. Moore, 195 Crawford road.
L. E. Hoffman, Lake and Marquette streets.
George C. Steele, 848 Euclid avenue.
A. Bradley, 1378 Euclid avenue.
F. B. Meade, 569 Euclid avenue.
The Cleveland Electric Illuminating Company, Cuyahoga Building.
O. E. and G. L. Muth, 1302 Detroit street.
A. Y. Gowen, 163 Handy street.
P. W. Webster, 793 Prospect street.
W. McMurray, 1141 Prospect street.
C. W. Pohlman, 719 Superior street.
Olds Mobile Company, 411 Euclid avenue.
M. B. Meade, 1702 Cedar avenue.
H. W. Hahn, 16 Kenwood street.
G. S. Case, 157 Jennings avenue.
Frank Kuzel, 1664 Lamont street.
Geneva Automobile Company, 230 Euclid avenue.
H. E. Hayes, 1500 Euclid avenue.
Dr. N. Stone Scott, 531 Prospect street.
C. W. Somers, 150 Bolton avenue.
C. C. Ferguson, 625 Superior street.
W. Meckes, 325 Franklin avenue.
F. Schneider, 176 Commonwealth avenue.
William F. Bonnell, 600 Prospect street.
William C. Shires, 352 Sibley street.
F. E. Now, 133 Handy street.
William Bingham, 611 Euclid avenue.
Thomas E. Rook, 814 Ansel avenue.
L. A. Kelly, 25 Vienna street.
C. W. Nokes, Glenville.
J. B. Gifford, 12 Granger street.
F. F. Prentiss, Lenox Hotel.
A. Hand, 73 Buhrer avenue.
J. C. Phillips, 839 Case avenue.
N. I. Dryfoos, 231 East Prospect street.
Mrs. G. M. Bacon, 922 Cedar avenue.
C. G. Draper, 578 Cedar avenue.
H. G. Blanchard, 652 East Prospect street.
J. A. Stephens, 1477 Euclid avenue.
F. F. Hickox, 595 Prospect street.
Cleveland Automobile Manufacturing Company, 40 Clara street.
E. S. Davis, 1062 Willson avenue.
D. C. Griese, 104 Tilden avenue.
J. S. Coke, 880 Arcade.
G. E. Harbaugh, 3053 Euclid avenue.
Cleveland Bicycle and Automobile Company, 399-401 Erie street.
F. W. Douglass, 734 Euclid avenue.
E. L. Thurston, Euclid Heights.
M. B. Grover, 2465 Euclid avenue.
E. S. De Mooy, 31 Granger street.
D. C. Lindsley, 608 Detroit street.
George D. Gordon, Euclid Heights.
H. A. Keeley, Euclid Heights.
B. F. Bower, 587 Prospect street.
C. I. Dangler, 1415 Euclid avenue.
E. R. Perkins, Jr., 211 Princeton avenue.
C. W. Hitchcock, 861 Prospect street.
L. Daniel, 1230 Curtiss avenue.
O. S. Southworth, 839 Prospect street.
C. H. Hower, 76 Cutler street.
H. C. Wick, Lenox Building.
G. J. Probeck, 40 West Hudson street.
C. D. Patch, 50 Clinton street.
G. A. Tower, 172 Harkness avenue.
Price Brothers Carriage Company, 112 Prospect street.
A. H. Swetland, 112 Euclid avenue.
James G. Moore, 392 Bond street.
C. H. Strong, Jr., Glenville.
William B. Jenkins, 46 Spangler avenue.
B. Crowell, 937 Prospect street.
R. A. Grock, 1135 Cedar avenue.
D. B. Wick, 848 Euclid avenue.
F. R. Gilchrist, 491 Russell avenue.
W. B. Chisholm, East Cleveland.
S. V. Sullivan, 1624 Euclid avenue.
W. C. Furst, Colonial Hotel.
F. B. Stearns, 2198 Euclid avenue.
W. D. B. Alexander, 1401 Euclid avenue.
J. W. Warwick, 36 Spangler avenue.
William S. Halle, 55 South Genesee avenue.
William J. Ellenberger, Lakewood.
S. D. Wise, 80 Beech street.
W. M. Cummer, 600 Prospect street.
A. E. Cummer, 2647 Euclid avenue.
A. J. Weatherhead, 144 Crawford road.
A. B. Shepard, 892 Euclid avenue.
D. E. Stone, 812 Prospect street.
W. H. Lauyer, 81 Calvert street.
P. B. Proper, 16 Cullison street.
M. L. Diebolt, 658 Woodland avenue.
Cleveland Automobile and Supply Company, 146 Prospect street.
Isaac Kirk, 1401 Euclid avenue.
E. F. Williams, 242 Riverside avenue.
P. R. Fahey, 82 Ingleside avenue.
W. C. Schroder, East Cleveland.
J. L. Severance, 84 Ingleside avenue.
H. J. Boggis, 1032 Willson avenue.
George L. Weiss, 75 Ingleside avenue.
A. S. Chisholm, 790 Euclid avenue.
Dr. W. A. Tims, 425 Wade Park avenue.
F. J. Jontzen, 195 Edwards street.
The Winton Motor Carriage Company.
White Sewing Machine Company.
D. Z. Norton, 1631 Euclid avenue.
O. Tomlinson, 267 Minnesota street.
William M. Wright, 680 East Prospect street.
L. A. Braham, Russell and Euclid avenues.
Bartlett Brothers Company, 178 Huron street.
W. A. Crawford, 831 Prospect street.
R. H. Gilbert, 192 Euclid avenue.
George Collister, 80 Quincy street.
C. R. Harbaugh, 25 Cornell street.
H. Hanna, Jr., 609 Prospect street.
George A. Burke, 14 Beechwood street.
F. N. Bendelari, 27 Wadena street, East Cleveland.
George H. Worthington, 742 Euclid avenue.
H. J. Byrer, 16 West Clinton street.
Frederic Harrington, 65 Tilden avenue.
Walter S. Root, 1341 Euclid avenue.
John J. Stanley, 639 East Prospect street.
E. Shriver Reese, 1603 Euclid avenue.
Loftin E. Johnson, Euclid avenue and Oliver street.
A. W. Foote, 555 Sibley street.
F. C. Harbaugh, 434 Giddings avenue.
Otto Miller, 501 Russell avenue.
Kirk-Latty Manufacturing Company.
L. J. Hammond, 19 Bertram street.
J. F. Harrison, 59 Irvington street.
J. H. Hord, 1650 Euclid avenue.
Elizabeth F. Johnson, Euclid avenue and Oliver street.
W. E. Curtiss, 546 Jennings avenue.
Peerless Manufacturing Company, Lisbon street.
R. & W. Jenkinson Company, 222 Seneca street.
Cleveland Automobile and Supply Company, 146 Prospect street.
F. L. Fisher, 246 Lincoln avenue.
W. R. Wilson, 120 Bolton avenue.
Dr. F. W. Walz, 121 Fulton street.
William V. Backus, East Prospect and Billings.
George W. Kinney, 1706 Euclid avenue.
H. W. Corning, 1147 Prospect street.
William I. Keetch, 153 Kinsman street.
George P. Comey, Jr., Euclid Heights.
C. R. Saunders, 1645 Euclid avenue.
F. J. Lauger, 13 Brookfield street.
George H. Bowler, 1645 Lamont street.
Edmonds Elevator Company, 144 Champlain street.
H. E. Collins, 743 Willson avenue.
C. W. Scofield, 284 Sibley street.
M. Lede, 145 Erin avenue.
A. J. Walters, 340 Wade avenue.
Krastin Automobile and Manufacturing Company, 1251 Clark avenue.
Dreher Sons' Company, 371 Superior street.
J. P. Macbeth, Hotel Bethel.
W. H. Canniff, 1059 Prospect street.
T. S. Beckwith, 1023 Euclid avenue.
Dr. W. P. Dunlany, Glenville.
C. F. Brush, 1003 Euclid avenue.
J. J. Parker, Euclid Heights.
C. M. Thurston, 708 Rose Building.
T. E. Webb, 19 Gale avenue.
M. K. Eyre, Lenox Hotel.
J. A. Lannert, 79 Beech street.
J. B. Zerbe, 502 Western Reserve Building.
H. S. Curtiss, 621 Prospect street.
H. B. Tuttle, Euclid, Ohio.
F. B. Richards, Euclid, Ohio.
G. H. Potter, 769 Case avenue.
J. H. Wade, Jr., 1043 Euclid avenue.
C. A. Blood, 191 Alanson street.
A. E. Douhet, 64 Fifth avenue.
F. C. Gates, 275 Sibley street.
E. H. Chadwick, 1824 Euclid avenue.
Mrs. W. J. White, Lake avenue.
E. H. Luetkemeyer, 193 Prospect street.
Otto Konigslow, 882 Scovill avenue.
J. W. Taylor, 39 Euclid place.
H. D. Marble, 405 Bolton avenue.
D. S. Humphrey, 2293 Euclid avenue.
F. A. Willard, East Prospect street.
A. Schneider, 56 Billings avenue.
William Taylor, Son & Co., Euclid avenue and Public square.
A. F. Holden, Glenville.
L. Dean Holden, Glenville.
W. E. Hartness, 600 Prospect street.
H. R. Palmer, 89 Brookfield street.
Theo. Kundtz, Lake avenue.
American Motor Carriage Company, 514 East Prospect street.
C. F. Vollkopf, 20 Willowdale street.
G. W. Beckwith, 287 Commonwealth avenue.
The Noble Automobile Manufacturing Company, 1178 Hamilton street.
L. J. Mueller, 1153 Woodland avenue.
James McIntosh, 50 Wright street.
C. B. Alcott, 1176 Euclid avenue.
M. A. Bramley, 19 Inverness street.
...on, 134 Miles avenue.
W. W. Balkwill, 394 Dunham avenue.
O. G. Snyder, 198 Archwood avenue.
The May Company, Ontario street.
J. H. Huy, South Brooklyn.
C. B. Dodge, 1737 Euclid avenue.
O. S. Southworth, 114 Ontario street.
G. S. Papworth, 83 Spangler avenue.
A. A. Dorn, 536 Jennings avenue.
S. W. Parsons, 6 Hough place.
Edwin Black, 460 Willson avenue.
Amstutz-Osborn Company, 718 Caxton Building.
A. G. Burgess, North Genesee avenue and Superior street.
H. A. Becker, 416 Rose Building.
H. V. Bright, White Hall, Fairmount street.
A. E. Akins, White Hall.
L. P. Mooers, 35 Olive street.
Dr. C. D. Ellis, 2182 Detroit street.
L. C. Lautermilch, 11 Jersey street.
R. B. Basel, Collinwood.
H. F. Cook, 132 Commonwealth avenue.
D. C. Baker, Tiffin, Ohio.
John Jack, 510 Lincoln avenue.
F. F. Sanford, 1668 Lamont street.
L. B. Herrick, 680 Prospect street (duplicate).
Lee Wright, 839 Prospect street.
H. L. Kinney, 841 Franklin avenue.
Byron B. Viets, 768 Genesee avenue.
L. A. Pomeroy, 116 Ingleside avenue.
C. M. Mix, Nottingham.
C. T. Draper, 578 Cedar avenue.
G. B. Pettengill, 600 Prospect street.
T. A. Weed, 358 Pearl street.
Alice Shilling, 124 Southern avenue.
John Baldwin, Jr., Berea, Ohio.
Dr. Fred L. Lewis, 1854 Pearl street.
W. H. Gifford, 773 Prospect street.
J. J. Jackson, 2900 Superior street.
Richard Bacon, 40 Hillburn avenue.
H. C. Osborn, 653 Euclid avenue.
B. W. Haskins, 45 Streator avenue.
Olive Payne Corning, 869 Euclid avenue.
F. T. Sholes, 27 Tilden avenue.
L. H. Elliot, 2000 Cedar avenue.
Mrs. R. S. Hall, 104 West Clinton street.
H. Chisholm, East Cleveland.
W. W. Adams, East Cleveland.
A. C. Eastwood, 877 Doan street.
George Faulhaber, Lakewood.
J. C. Scott, 237 Franklin avenue.
E. D. Clarag, 71 Alanson street.
F. W. Beach, 27 Auburndale street.
B. F. Day, East Cleveland.
J. W. Cobb, East Prospect and Billings.
G. D. Adams, 103 Edgewood place.
A. G. Hutchinson, 2683 Euclid avenue.
V. C. Lucas, 375 Jennings avenue.
J. P. Brophy, 1073 Central avenue.
Baker Motor Vehicle Company, 118 Jessie street.
E. L. Strong, Lakewood.
A. S. Ingalls, Euclid Heights.
F. A. Merritt, 930 Euclid avenue.
A. S. Ingalls, Euclid Heights.
E. G. Deericks, 1624 Lexington avenue.
C. F. Alcott, 116 Edgewood place.

Kansas City's One Hundred Mile Endurance Run.

The 100 mile endurance run organized by the Kansas City Automobile Club came off as scheduled on July 18. There were fourteen entries, as follows (in order of arrival at the finish):

	A. M.	P. M.
Haynes-Apperson semi-racer, D. F. Piazzek	9:39	3:40
Haynes-Apperson runabout, Frank Nutt	9:41	4:58
Toledo steam, W. T. Irwin	9:35	5:43
Foster steam, M. C. Albertson	9:47	4:53
Pierce motorette, H. W. Loose, dis.	9:47	....
Motorette, C. F. Lovejoy	9:43	....
Pierce motorette, E. P. Moriarty	9:45	8:19
Pierce motorette, P. P. Pierce	9:45	5:15
Oldsmobile, R. L. Husk	10:02	....
Locomobile touring car, T. W. Day	9:51	....
Friedman runabout, James Whitman	9:49	....
Locomobile, A. C. Webb	10:05	5:35
Locomobile, L. W. Purple	10:30	....
Foster steam, C. S. Hall	11:04	....

The course was supposed to be over as good roads as could be found in that section. The weather offered some variety, rain mingling with the sunshine. Half the entries succeeded in pulling through, though only one came through without a single stop—the motorette driven by Percy P. Pierce. D. F. Piazzek reached the goal nineteen minutes ahead of time, in consequence of the six hour limit, and was accordingly disqualified.

Ignition troubles due to the wet weather

to furnish the most frequent causes
among the gasoline vehicles.

ıtomobile War on the North Shore, Chicago.

mayors of the towns along the Shore above Chicago are resorting more extreme measures to put a auto scorching. The mayor of : has stretched a wire cable across d and stationed deputies with stop at marked intervals along the way. arranged signals the automobiles ed, and if the speed is found very e the rope is made taut and escape d.

› rope was formerly used, but some nore determined offenders are re- :o have fitted scythelike cutters in their machines, which made short such ropes.

ınother mayor throws cord wood logs in the road to bring offenders ndstill, so the Chicago papers say.

›mobile Accident Insurance.

New York accident and insurance ies have again increased the rates nobile insurance. All of them re- .t they have lost money in the busi- ıd are not specially eager for it the new rate, which is $100 per as compared with $25 a year and go. Whereas there were ten com- writing automobile insurance in ork a year ago only four are now be paying any attention to this of the business. The usual policy a limit of $5,000 where the injury ined to one person and $10,000 ;everal are injured.

lotor Ash Carts to Be Had.

:w York city it was reported some ;o that three gasoline motor ash 'ere building for the use of the leaning department. A recent re- s it that no suitable vehicle could red. Less attention has been paid commercial vehicle in the United ɔy automobile manufacturers than land, where some makers have themselves exclusively to the 'cial vehicle, and others who have prominence as builders of pleasure are now entering the wider field :ruck, the van, the delivery wagon omnibus.

ıtable Lack of Forethought.

uto stage line over the Sierras from ille to Lake Tahoe, Cal., is having ime of it. The first trip consumed ıys.

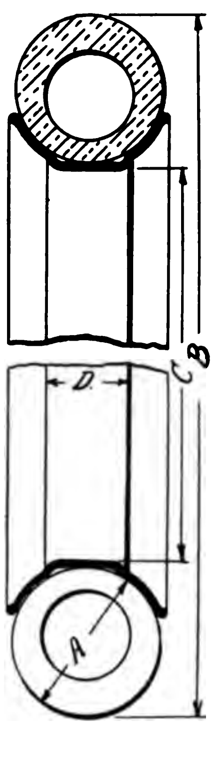
ıe second trip the machine ran out ine, and the passengers were obliged and push the machine to the near- :e. A fresh supply of fluid was at a mining camp, and it was de- return to Placerville.

On the return trip the regular horse stage coach was encountered, and the horses attached to the vehicle became frightened, whirled short around and snapped off the tongue of the stage. The automobile then conveyed the passengers to the nearest point.

"If the enterprise is to continue," the report says, "it will be necessary to establish supplies of gasoline along the route, at which the tank on the machine may be replenished."

Steel Rims for Wood Wheels.

The Standard Welding Company, Cleveland, Ohio, manufacturers of steel rims and tubing, have established the following standards for their flat base rims used in connection with wood wheels:



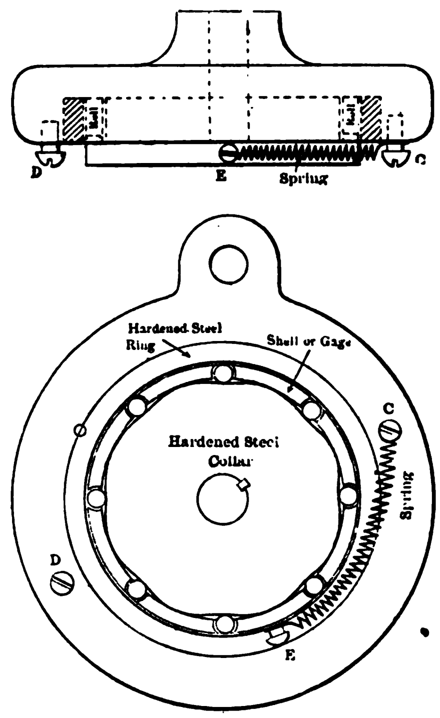
Sizes of Tire.		Dia.	Base.
A	B	C	D
		Inch.	Inch.
1½	26	22 13/16	¾
"	28	24 "	"
"	30	26 "	"
"	32	28 "	"
"	34	30 "	"
"	36	32 "	"
1¾	26	22 5/16	13/16
"	28	24 "	"
"	30	26 "	"
"	32	28 "	"
"	34	30 "	"
"	36	32 "	"
2	26	21 23/32	7/8
"	28	23 "	"
"	30	25 "	"
"	32	27 "	"
"	34	29 "	"
"	36	31 "	"
2½	26	20 49/64	1⅛
"	28	22 "	"
"	30	24 "	"
"	32	26 "	"
"	34	28 "	"
"	36	30 "	"
3	26	19¼	1¼
"	28	21 "	"
"	30	23 "	"
"	32	25 "	"
"	34	27 "	"
"	36	29 "	"
3½	26	18 47/64	1½
"	28	20 "	"
"	30	22 "	"
"	32	24 "	"
"	34	26 "	"
"	36	28 "	"
4	26	17 47/64	1¾
"	28	19 "	"
"	30	21 "	"
"	32	23 "	"
"	34	25 "	"
"	36	27 "	"

The company manufacture rims for wire, tubular and wood wheels for all sizes of tires, from 1¾ to 4 inches, and guarantee absolute uniformity in circumferential measurement and shape of cross section.

A circular entitled "Seamless Steel Rims" illustrates eleven shapes of rims and a number of flanges.

The Horton Clutch.

In the *American Machinist* of July 17 James A. Horton, of Providence, R. I., furnishes a sketch of a clutch which he patented July 4, 1882, and which he claims is an anticipation of the automobile transmission device patented by Geo. S. Strong, of New York, some two years ago, and by



him assigned to the Motor Truck Company, of Philadelphia. Mr. Horton states that the device was regularly manufactured as a reversible roller feed for power presses, as shown in the sketch. This will turn the inside collar in one direction if the spring is attached to the screw C, while it will work in the opposite direction if the spring is attached to screw D, the other end of the spring being attached to a screw on a shell or cage. The patent has now expired and the device is public property. It is called the Horton clutch.

More Forceful Than Eloquent.

Mayor Mike Stein, of Fulton, W. Va., recently arrested young Vance, of Wheeling, son of the millionaire steel magnate, and fined him $20 and costs for running his automobile too fast. When young Vance reminded the mayor whose son he was that official is reported to have replied with more force than elegance: "I don't gif a d—n who you are. Such a kind of pizness don't go here."

Catalogues Received.

Automobiles. — The Haynes-Apperson Company, of Kokomo, Ind.

Columbia Automobiles.—Electric Vehicle Company, of Hartford, Conn.

Rambler Automobiles.—Thomas B. Jeffery & Co., of Kenosha, Wis.

Studebaker Automobiles. — Studebaker Brothers Manufacturing Company, of South Bend, Ind.

The Golden State Automobiles.—Golden State Automobile Company, of San José, Cal.

The Kelecom Motor and Autolyte Acetylene Lamp.—A. H. Funke, 98 Duane street, New York.

MINOR MENTION

W. K. Vanderbilt, Jr., is reported to have purchased the Renault which won the Paris-Vienna race.

A new storage and repair depot is to be built on Sixty-seventh street, New York, near Amsterdam avenue.

Grimes & Robinson, Nashville, Tenn., are said to be the first department store south of the Ohio River to use motor delivery.

It is reported that John Brisben Walker, president of the Mobile Company of America, may build an automobile plant at Denver.

Charles Hahn, David Klein and B. Greenwood have organized the Hahn Auto Company, Pueblo, Col., with a capital of $50,000.

At the recent annual meeting of the directors of the International Motor Car Company, Toledo, Ohio, no change was made in the officers.

D. R. Grow, East Orange, N. J., is spending his vacation touring through New England in his automobile, expecting to travel 3,000 miles by September 1.

Edgar A. Apperson, of the Apperson Brothers Automobile Company, Kokomo, Ind., is running one of their new touring machines from Chicago to Boston.

O. P. Dorman, president of the Salamandrine Boiler Company, New York, has returned from England, where he has been making arrangements to introduce the Salamandrine boiler.

The Mississippi Valley Automobile Company, of St. Louis, has been incorporated with a capital stock of $48,000, all paid by Harry S. Turner, Jr., H. M. Coudrey, George A. Meyer and others.

Several of the students at the Rose Polytechnic Institute, Terre Haute, Ind., are building experimental gasoline motors or automobiles, with the intention of making a specialty of this line of work after graduation.

F. A. Law, Hartford, Conn., formerly connected with the Electric Vehicle Company, has completed the touring car on which he has been engaged for some months. It is modeled after the best French machines.

An amended certificate of incorporation of the Prescott Automobile Company of Passaic was filed recently. In the original certificate the whole $200,000 capital stock was stated as paid in. The later one has only $1,000 paid in.

The corporation counsel of Washington, D. C., has rendered an opinion to the superintendent of police to the effect that owing to the decision of the Court of Appeals in the case of the District of Columbia against the Washington Electric Vehicle Transportation Company all automobiles and other horseless vehicles are to be considered in the class of private vehicles and are not entitled to use the public stands and remain in front of public places when not engaged.

The proposed $7,000,000 automobile and bicycle boulevard between New York and Chicago, which was much talked of in the newspapers some time ago, is said to have been abandoned, owing to lack of money to put the project through.

At the meeting of the creditors of the Steam Vehicle Company of America, at Reading, Pa., on July 30, Trustee Thomas K. Dalzell will make a recommendation that the plant be operated. Claims aggregating $20,000 have been filed against the company.

The H. H. Franklin Manufacturing Company, Syracuse, N. Y., expects to take possession of its new plant, which is to be erected on South Geddes street, early in the fall. The high speed machine which is being built for President Alex. T. Brown will be finished in September.

The North Shore Automobile Club has been organized at Boston, Mass., by a number of prominent summer colonists along the North Shore. Walter D. Denegre, of New Orleans, has been elected president; Dr. Charles T. Parker, of New York, vice president, and Quincy A. Shaw, Jr., of Boston, secretary and treasurer.

After August 1 the Automobile and Cycle Parts Company will transact business under the name of the Federal Manufacturing Company. This change of title will not in any manner affect the management of the company or the business of its factories. The products of the company's factories are so diverse that a comprehensive firm name has become a necessity.

The Arrowhead Company, of San Bernardino, Cal., ask that a toll of $25 be imposed on automobiles for a trip over their mountain toll road, claiming that the automobile is very dangerous to teams on a mountain road. The board of supervisors suggest that the automobile send a man ahead 100 yards to warn drivers of horses and that the automobile remain stationary until the coming team passes by.

L. E. Holden states that he is the sole proprietor of the depots at 523 Fifth avenue and 12 East Twenty-seventh street, New York, his trading style being the Westchester Automobile Company, and that he has no connection with any other concern or place. The reason for this statement is that it has been supposed he was associated with another enterprise bearing a somewhat similar name.

Oscar Werking, mail carrier on rural route No. 2 out of Hagerstown, Ind., has purchased a $600 automobile to be used in making his deliveries. His salary is $600 a year. Since last November he has worn out a $200 horse in the work and has spent much for repairs and feed. The automobile enables him to finish the trip in two hours and a half, leaving him the afternoon to work at his trade, whereas before the entire day was consumed in the trip. The Postmaster General has authorized the use of the machine and will recommend the general use of autos in this work if this is found satisfactory.

Ernest Cuenod, vice president of the Swiss Automobile Club and agent of a number of foreign manufacturers in this country, has filed a protest against the decision of the racing committee of the Automobile Club of America in awarding the prize in the middle weight class of the Staten Island races to Percy Owen, New York representative of the Winton Company.

The Haynes-Apperson Company, Kokomo, Ind., are about to build another factory addition, 41x200 feet, similar to that recently put up, and to make substantial additions to their foundry and office departments. The new buildings will give them a total of 75,000 square feet of floor space. Even with improved facilities the company will not be able to catch up with its orders before the middle of September.

Legislative and Legal.

Hoboken, N. J., is about to adopt a speed ordinance.

The 10 mile limit law has gone into effect at Toledo, Ohio.

The director of public safety, Scranton, Pa., has instructed the chief of police to enforce the vehicle law, with special reference to automobiles.

Five arrests for fast automobiling were recently made at East Williston, L. I., the home of Senator Cocks, author of the present New York State automobile law.

James Madison Porter, U. S. A., said to be a member of the Automobile Club of America, was recently arrested at Ardmore, Pa., and fined $15 and costs for violating the speed ordinance.

President Cantor, of the Borough of Manhattan, states that he intends to introduce an ordinance at the next session of the board of aldermen visiting a heavy penalty upon those who leave their automobiles standing unlocked.

At Nashville, Tenn., Leland Hume and A. P. Harrison are being sued for $20,000 damages by a man named Lane, who was driving a mule last November, when he met the former's automobile. The mule ran away, injuring plaintiff and others.

The first automobile damage suit in San Francisco came to a hearing the other day, when a salesman for a tailoring firm sued E. Courtney Ford and two others for $5,000 damages for injuries sustained by being run over by Ford's automobile on Market street on June 6 last.

The eight automobilists—two of them doctors—who were arrested in Buffalo for alleged violation of the automobile law were discharged by the magistrate, who stated that he did not believe the 8 mile limit referred to the boulevard section of

, and was of the opinion that physi- iould have a little leeway on hurry

ıing is added to the list of Long towns which are in favor of en- the Cocks law.

y P. Doherty was arrested for ex- the speed limit at Saratoga Springs, recently. The police are posting g notices.

. Thomas, the New York banker is recently on trial for killing a boy s automobile, is defendant in a suit t by the owner of a valuable St. d dog, which Thomas is alleged to in over and killed on Jerome avenue. ecial committee of the Milwaukee obile Club has drafted an automo- linance to be submitted to the coun- iting speed in the busy districts to an hour, in the outlying districts to s and in turning corners to 4 miles. 5 cents license fee is not recom- l.

ce Wallace, of the United States Court, who has a summer home in ıvia, N. Y., is said to have sworn warrant for the arrest of George S. ee, a well known Syracuse chauffeur, the judge claims, recently passed h the former town in his automobile al speed.

ording to the Philadelphia *Times* rate Lukens, of that city, in fining a ur who had been arrested for fast on Broad street the other day de- d him severely and ended by say- at if any of his own relatives or were run over by a reckless auto- st he would resort to the pistol.

ard A. Mulligan, of Quincy, Mass., sides during the summer at Cottage is charged with manslaughter and iolation of the automobile law by Officer Thomas A. Dexter, and is nder bail to appear for trial on July n the afternoon of July 18 a horse by Ariel B. Scott, of Westbury, be- frightened at Mr. Mulligan's auto- , which, it is alleged, was being at a greater speed than permitted law, and threw out Mr. Scott, who venty-seven years old, and who re- injuries which caused his death.

Automobile Accidents.

automobile standing by the curb is ed to have been struck by lightning er day. The owner was in a nearby

ton electric truck used by the Rup- Brewery, New York, collided with a car the other day and knocked it wise across the track.

Adolph Levy and son, of New York, rly missed a serious accident near Haven, Conn., recently. They were g through New England and be- of approaching rain were "letting o reach New Haven before the broke. In going down Mill Rock hill the vehicle skidded and slid against a large boulder by the roadside, breaking several spokes in one wheel and springing the steering gear. Neither occupant was injured.

An 8 ton automobile on its way from Charles City to Mason City, Iowa, to be delivered to purchasers, went into a small creek near Nora Springs, recently. A bridge gave way and let the automobile down 12 feet in mud and water. No one was injured.

Two runaways were caused by an automobile at Delaware, Ohio, recently. A woman who was driving a horse to market was thrown against a telegraph pole and probably fatally injured, and a man who was mowing in a field was thrown from his seat and terribly cut by the knives.

A scorching auto is reported to have run into a carriage on the Atlantic City road near Hammonton, N. J., last week, wrecked it and threw the occupants out. Telephone messages were sent ahead and an armed crowd gathered to intercept the driver, but he evidently took another route.

On July 25 an automobile containing James Ryder, of Bridgeport, Conn., and his entire family, five in all, became unmanageable owing to defective steering gear, and plunged over the embankment into the Kennebec River at Madison, Me. The current is very swift at the point, but all were saved. The automobile was a wreck.

Two serious collisions are reported between automobiles, one at Newport, R. I., between a large machine owned by F. C. Havemeyer and another supposed to be the property of John I. Blair, of New York; and another at West End, N. J., where an electric and a gasoline machine are said to have collided without injury to the occupants.

Press dispatches state that a gasoline machine owned by V. Preston, of Monmouth Beach, N. J., with three occupants, was overturned at Little Silver Lake Sunday night, and fell into a ditch on the edge of the river. The escaping gasoline frightened the men, who, though suffering from injuries, endeavored to stop it. They ignited a match, and instantly the machine was enveloped in a blaze that consumed it entirely.

Start of the Paris-Vienna Race and Other Notes from Paris.

Following is some further correspondence from the "American Apprentice Boy in a French Works," whose first letter appeared in these columns recently:

At 11:30 p. m. I left the works with the rest of the repairers for Champigny in the repair wagon. We built a temporary shop immediately behind the starting line for the Paris-Vienna race. We were kept quite busy for the first few hours, as many of the machines had to have some little repairing done, and all had to be inspected before the start.

However, I went out as far as Cretz in the 20 horse power vehicle belonging to our foreman. There I saw several cars at full speed. I saw Clément moving at about 90 kilometres and d'Arnaud at about 100 kilometres in his Mors. I saw all of the 216 machines start. The most imposing was Girardot moving up a very steep hill at about 60 kilometres. The roads were very dusty, and it was a grand sight to see the people lined up on each side of the road. This line of dust covered heads extended for about 50 or 60 kilometres.

There is not much work done here in the works now, as the manager brings in every telegram for us to see how the machines are getting along in the race. All the machines left at intervals of two minutes, and ten of the first to start were already at Belfort when the last were getting ready to start.

I am at present working on an old time Daimler, which looks as though it had not been touched for years. It is a delivery wagon, belonging to the Michelin Tire Company. It is certainly a fine machine.

The racers are beginning to come back from Vienna. The two Farman brothers arrived here yesterday and De Knyff today (without his machine).

The main shop of our works, the "Palais," as it is called, is a beautiful shop. It consists of only one large room, in which over 1,000 men are at work. Overhead are hundreds of pulleys and miles of leather belts. The new shops, into which we shall move some time in the month of August, are really beautiful. There is a track on which the machines are tried. It runs all around the shops and there are steep banks to turn the corners. These shops consist also of one large room. The pits to work under the wagons are well made and fitted up.

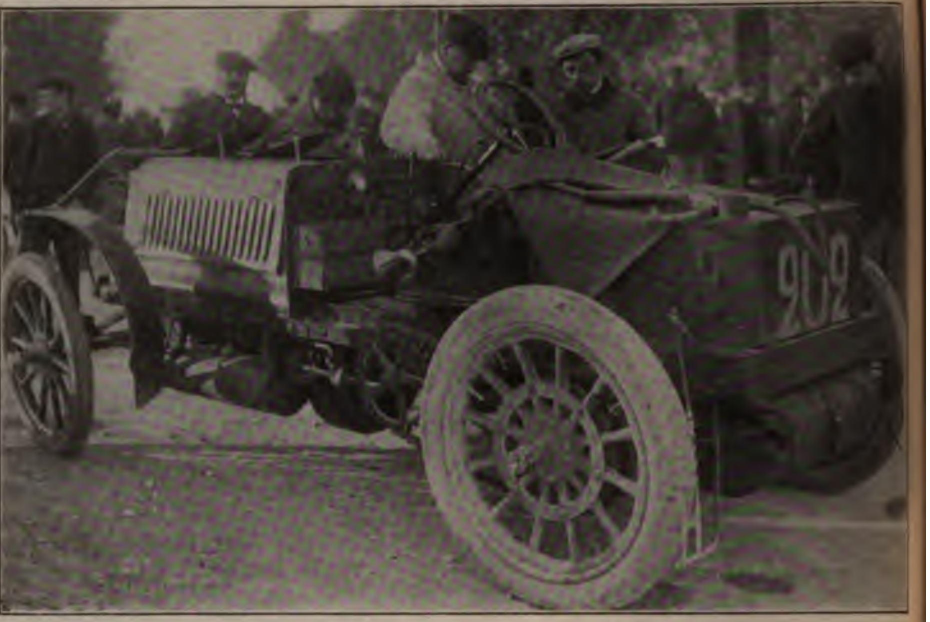
A difficult thing to do in automobile repairing is to get the clutches to meet; that is to say, to get the male and female cones to fit well. When the leather on the clutches gets too smooth it is filed with a wood file. I went out to the country the day before yesterday with another man to put a new spring on the clutch of a vehicle. It is not a hard job, but a hot job to do in the sun.

The new motors of this firm are made of one solid casting for the side of the cylinders and the explosion chambers. They thus do away with the joint between the cylinder and head. They have both electric and tube ignition. The burners are in the same place as usual. The electric spark plugs are on the top of the motor. The admission valves are immediately above the exhaust valves. The cams for the exhaust valves are covered with an aluminum case. The ignition is variable, and the motor speed controlled by a regulator. This is the way they start the motor: Before the electricity is turned on the starting crank is turned four times and then disengaged by the "mécanicien." The driver then turns on the electricity, and if the motors do not start at once he moves

the spark lever up and down, and if there is any gas in the explosion chamber the motor is bound to start. He has to take care to get the spark lever back to the first notch as quickly as possible.

When it is very hot it is a great relief to some motors to disconnect the muffler. The motor does not get half so hot. In Paris none of the tricycles or bicycles use mufflers. The new motors of this firm have an exhaust pipe for each cylinder, as with one pipe for two cylinders the two exhausts interfere with one another.

On the first day of the race one of the vehicles that went out to see the racers go off got disabled coming home. It was a 40 horse power touring car, and the driver wanted to show some ladies with him how fast the machine could go and how effectively the brakes worked. With his hand brake (a band brake working on drums next to the sprocket on the hind wheel) he squeezed every spoke out of place, smashed the sprocket, threw himself into some bushes on the side of the road, one of the ladies followed suit, and another would have done the same had not her dress caught in the gear changing lever. It was a nice mess for two of us to pick up. We lifted the hind part of the machine with jacks, put on two new wheels and chains, and after a few hours got the machine home again. J. J.



75 Horse Power Panhard Using Alcohol as Fuel.

The Paris-Vienna Race—Two Representatives of the Heaviest and Lightest Types.

Not all the vehicles that competed in the Paris-Vienna race were built for that contest. This is especially true of the motor bicycles, motor tricycles, a great many of the light vehicles and some of the heavy ones. The Daimler-Mercedes cars that were driven by Zborowsky, De Forest and others were said to be 40 horse power machines of the same type that was described in a former issue of The Horseless Age. In contrast to the Panhards, these racers are of heavier construction throughout, and their ratio of weight to horse power, when stripped, is approximately $\frac{2200}{40}$. In the case of their French rivals this ratio is said to be $\frac{2200}{75}$.

Some of our foreign contemporaries attribute the good showing of the German machines in the Arlberg Pass to their stanchness and the faith placed in them by their operators. Baron de Forest beat all his rivals on the descent and arrived at the control station an hour before the next competitor. Had his supply of fuel not given out he would, it seems, have reached the Austrian capital well ahead of the procession.

The 75 horse power Panhard (No. 202) was operated by P. de Crawhers, who was the sixth arrival in the heavy class and the fourth operator of a high powered car of this make to reach Vienna. The 24 horse power Panhard-Levassor, which was driven by Berteaux and competed in the light car class, reached the goal ahead of No. 202. But for the Arlberg Pass and the bad road in the Tyrolese Alps the heavy machines would have made better time, instead of being obliged to run at a speed beyond which none of the racers could be driven with comparative safety. Over this portion of the course the light cars sped at the same or higher rate of speed than their big rivals.

To reduce the weight of their front axles Panhard & Levassor employed but a single platform spring in place of four spring brackets and two side springs. The single platform spring is undoubtedly lighter than two suitable side springs would be, and owing to the fact that the supports of the spring are closer to the knuckles and the centre of the wheel hubs than the spring rests of side springs would be, the front axle in such a car may be made lighter for a given load than it would need be in case side springs were used. The spokes of the wheels impress the observer as being very light, and the builders, it seems, therefore resorted to the use of rings through which the bolts that transmit the power from the rear sprockets to their respective drivers pass. In case a spoke springs those metal rings will transmit the strain to the rest of the bolts and the spokes. The wheel base of this racer is extremely long, and exceptionally large rear wheels and tires are fitted. In an account of the first stage it was said that the machines that reached Belfort from Paris at an early hour arrived with very warm tires. The large oblong tank on the back of No. 202 contained the fuel, which in this case was alcohol.

The motor bicycle No. 177, which we illustrate, is known in France as the "Bruneau," and was ridden by M. Neron, who made a successful run to Vienna. The little machine is chain driven and has a slightly longer wheel base than an ordinary bicycle. By means of a friction clutch which is located on the right side of the

The Repair Outfit of Panhard-Levassor.

M. NERON AND HIS BRUNEAU MOTOR CYCLE.

ar hub, the motor may be thrown in or it. The winner in the motor bicycle ass was Bucuet, who rode a belt driven cycle, a 2 horse power Werner.

The third half tone illustrates a 10 horse ower Panhard which followed the racers the capacity of repair wagon. It repre-nts a recent type of touring car brought it by them.

Packards in England.

It is reported from England that the ackard gasoline carriages are about to e placed upon the market. A. L. Mc-Iurtry, of the Adams-McMurtry Com-any, Eastern agents of the Ohio Com-any, has been abroad for some time with iis object in view.

NEW VEHICLES AND PARTS.

The Ball Steam Tonneau.

In a former issue of THE HORSELESS AGE a brief description of the heavy steam tonneau designed by Col. C. A. Ball was given. We have collected data since the former description was made and are now in a position to give a more detailed description of this well built and interesting machine. One of the halftone engravings shows a side view of the carriage, the other illustrates the boiler fittings, which are grouped in such a way as to be in sight at all times. The designer has introduced other locomotive features into his car, such as a horizontal engine, a throttle that cuts off the steam supply when thrust forward instead of being pulled back, and an automatic lubricator.

GENERAL ARRANGEMENT.

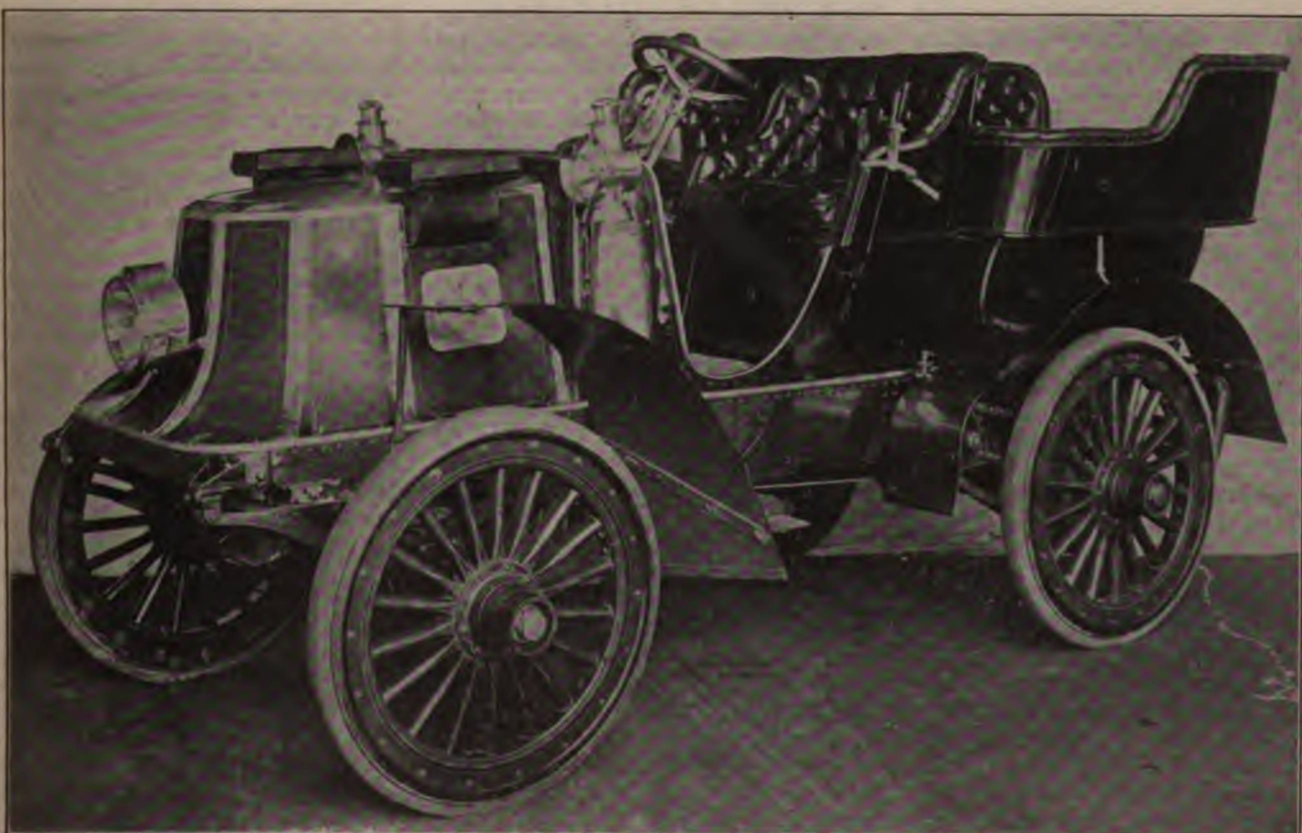
The boiler is located under a sheet metal bonnet in front. All of its fittings are attached to the back between the metal wind shields, which form a sort of dash. The body is composed of the main seats, two tonneau seats in the rear, and their boxes. The engine lies under the body and drives the differential by means of a chain. The driving wheels are driven individually by roller chains. The water tank is located under the front seat, the gasoline tank is under one of the tonneau seats, and the condenser is placed under the other.

THE RUNNING GEAR AND FRAME.

The wheel base is 8 feet and the tread is standard. All the wheels are dished, especially those in front, and have a diameter of 36 inches. They are shod with 2½ and 3 inch Dewes & Whiting solid rubber tires, have 18 spokes each, which are driven into metal covered wooden hubs with plain bronze bushed bearings, and have steel rims that were forced over the felloe by hydraulic pressure. The suspension springs are composed of 9 leaves in front and 8 in the rear. The side springs are 36 inches long and are of the semi-elliptic type. Platform springs are also employed. The one in front is pivoted so that a front wheel may be raised without raising the body on that side. Abnormal strains on the frame are thus done away with. Dalzell solid axles are used. No reaches are fitted to the running gear in order to get the best riding qualities. The slack in the side chains is taken up by adjusting the turnbuckles of the distance rods in the usual way. The frame is made of an angle steel shape in one piece. It is reinforced all around by a steel plate that takes the place of either trusses or wooden beams, and is riveted to the frame proper. The thickness of this sheet or plate is about 3-16 inch. Its height varies with the strains, that is to say, where the latter are greatest (in the vicinity of the centre, between the axles) the height of the sheet is greatest. All the crosspieces are riveted to the frame, in the construction of which no bolts enter.

THE BOILER AND ITS FITTINGS.

The boiler is of the fire tube type, 24 inches outside diameter, and it has 986 copper tubes 10 inches long. The burner



STEAM TOURING CAR DESIGNED BY C. A. BALL.

Rear View, Showing Lubrication.

is built for the use of gasoline fuel. Later on a kerosene burner will be installed, which the inventor of the system is now perfecting. The flues of the boiler are below it and arranged so that the products of combustion are carried off to the rear of the car. When raising steam a valve is opened as soon as a little pressure is recorded by the steam gauge and steam escapes into the flues and creates a strong draft.

The fittings of the boiler consist of a water gauge glass, which is of unusual length and of the self contained type, an automatic cylinder lubricator, try cocks, an Ofeldt auxiliary, valveless steam boiler feed pump (secured to footboard) and an emergency main throttle valve, which is closed when the machine is left standing in the street to prevent mischievous boys from starting the vehicle by operating the lever throttle. The steam gauge and air gauge are also secured to the boiler. The former is on the control or left side of the machine, and registers up to 300 pounds; the latter is on the right side and registers 100 pounds maximum pressure per square inch. The water, steam and air gauges are provided with miniature incandescent lamps, each of which will glow when the operator touches a button. A small storage battery supplies current to these lamps. A diaphragm controls the fire, but no thermostat is used. The normal boiler pressure is 250 pounds. The safety valve blows off at 260 pounds pressure.

Water (68 gallons) sufficient to make a run of 35 miles is carried. Gasoline is carried in two tanks, which are drawn tubular shells with a joint capacity of 24 gallons.

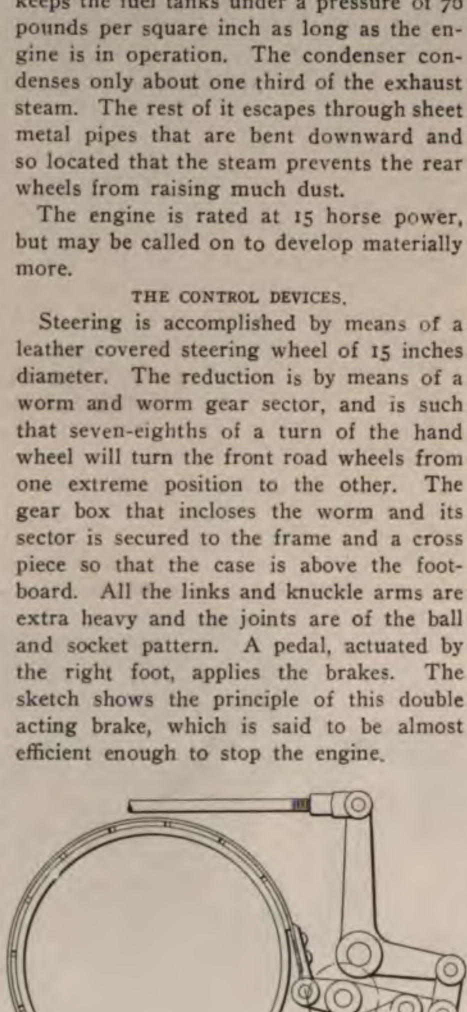
THE ENGINE

is of the compound type. It has two high pressure cylinders and two low pressure cylinders, all double acting. The cranks of the former pair are at 180 degrees to each other, as are those of the latter, so that the engine is balanced more perfectly than would be possible with counterweights only. It is said that the engine is capable of running at 3,000 revolutions per minute without making any noise, and that it does not vibrate at any speed. The crossheads and the shaft and rod boxes are all of bronze. All journals and other wearing parts are of generous proportions, in order to reduce wear to a minimum. An intercepting valve is provided, which converts the engine into a simple one whenever steep grades call for more power. The main boiler feed pump is made of bronze throughout and is driven positively by the engine. It is a horizontal pump and is located under the footboard on the operator's side. The air pump is of the same appearance, but is situated on the right hand side of the machine. To get at the pump it is only necessary to remove two small boards which are let into the footboard. The air pump runs continually and keeps the fuel tanks under a pressure of 70 pounds per square inch as long as the engine is in operation. The condenser condenses only about one third of the exhaust steam. The rest of it escapes through sheet metal pipes that are bent downward and so located that the steam prevents the rear wheels from raising much dust.

The engine is rated at 15 horse power, but may be called on to develop materially more.

THE CONTROL DEVICES.

Steering is accomplished by means of a leather covered steering wheel of 15 inches diameter. The reduction is by means of a worm and worm gear sector, and is such that seven-eighths of a turn of the hand wheel will turn the front road wheels from one extreme position to the other. The gear box that incloses the worm and its sector is secured to the frame and a cross piece so that the case is above the footboard. All the links and knuckle arms are extra heavy and the joints are of the ball and socket pattern. A pedal, actuated by the right foot, applies the brakes. The sketch shows the principle of this double acting brake, which is said to be almost efficient enough to stop the engine.



Brake Mechanism.

The brake bands are of steel, and are lined with brass, which can be replaced very readily. Owing to the fact that the vehicle is entirely enclosed from below by a sheet steel trough, it was necessary to drive by means of side chains for this reason as well as for the reason that the designer prefers that system. The rod that applies the brake is on the outside, because if it were under the body it would have to be removed whenever the trough was taken out.

LUBRICATION.

As has been said before the engine cylinders are lubricated by an automatic lubricator of the type in universal use on locomotives. All the other bearings of importance receive their supply from a multiple feed oiler with 20 "points." The receptacle of the latter holds about 2 gallons of oil and has glass heads. This lubricator is secured to the back rest of the front seat, so that it is in full view of the occupants of the tonneau seats at all times.

THE BODY.

The panels of this car are of sheet steel, while the backs of the seats are of wood. The front seat has a dividing wall. If the latter is removed three passengers, inclusive of the operator, may be carried, making the total complement nine persons. The front seat is 20 inches deep and 48 inches wide, the side seats are 19 inches deep and 44 inches long. In future the tonneau seats are to be arranged differently, i. e., the door will have a collapsible seat attached to it, so that three of the passengers in the rear may face forward. The fenders are of wood, and made up three layers glued together, one of which runs crosswise. In front these mud guards are 13 inches wide and in the rear 10 inches.

The vehicle weighs 4,600 pounds, including supplies, and is said to be capable of running at the rate of 40 miles an hour on good roads.

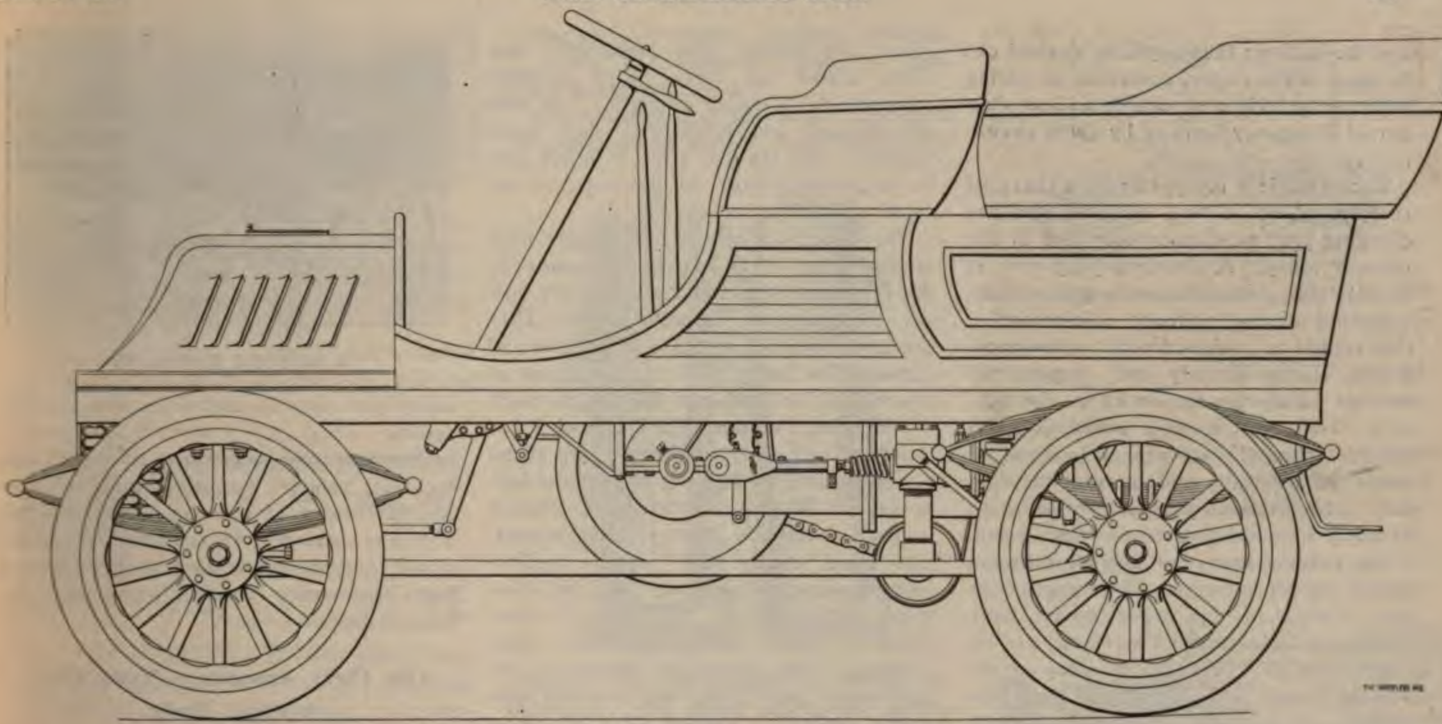
A Special Gasoline Tonneau.

R. W. Coffee & Sons, Richmond, Va., are building the gasoline tonneau here shown to the order of Charles E. Miller, 87 Reade street, New York. The vehicle is intended for Mr. Miller's personal use and is being built according to his own specifications.

The wheel base is 7 feet and the track is 5 feet, or slightly more than standard. All the wheels are of 30 inches diameter and have pneumatic tires of 3½ inches cross sectional diameter. The hubs are of the artillery pattern, now so popular. The front wheels run on ball bearings while the rear wheels are keyed to the live shafts, which revolve in bearings that are integral with the spring rests. The body springs, of the full elliptic type, are 36 inches long. Tubular reaches keep the axles in parallelism.

The motor is rated at 16 horse power and is known in the market as the "Binate." It is a horizontal engine of the medium speed variety and is controlled by shifting the spark and by varying the compression. The crank case is entirely enclosed. The gear speed changes are derived from an Upton planetary gear which gives two forward and a reverse speed.

The frame of the vehicle is made up out of 3 inch channel steel shapes. Its width is 38 inches and it, therefore, permits the use of a wide body with comfortable seats.



Special Touring Car Designed for Charles E. Miller.

The length of the frame is 9 feet 6 inches over all.

The drive to the rear axle is by means of a roller chain, which makes the drum of the differential revolve. The latter, of the spur gear type, was manufactured by the Brown-Lipe Company.

The forward portion of the frame is covered by a copper bonnet. To promote comfort when touring on rough roads a partition is inserted in the middle of the front seat.

The body is of strong construction and has high back rests. Access to the tonneau is had from the rear. In case of an emergency three passengers may be carried in each tonneau seat.

Steering is done by means of a 15 inch wheel, secured to an inclined column and having a worm and worm gear sector reduction below. The other control devices are a foot pedal, which applies the brake on the differential drum, two levers on the right hand side of the body and an arm that controls a sleeve which surrounds the steering post, the latter varying the compression.

The Studebaker Electric Vehicle.

The Studebaker Brothers Manufacturing Company, of South Bend, Ind., have kept in close touch with the progress of mechanical locomotion from the time of its beginning in this country, and have at last entered the field as manufacturers by bringing out a line of electric vehicles. A characteristic feature of these vehicles is that the motor is suspended from the body frame and the power is transmitted to the rear axle by means of a chain.

The battery with which these vehicles are regularly equipped has not the extremely high capacity of some others, but is more durable than these. A battery of twenty-four cells is used, a compromise between the two extreme practices in this respect. The battery is so arranged that its location is not directly over that of the motor, as is the case in many vehicles, so that in this vehicle any drippings from the battery fall to the ground.

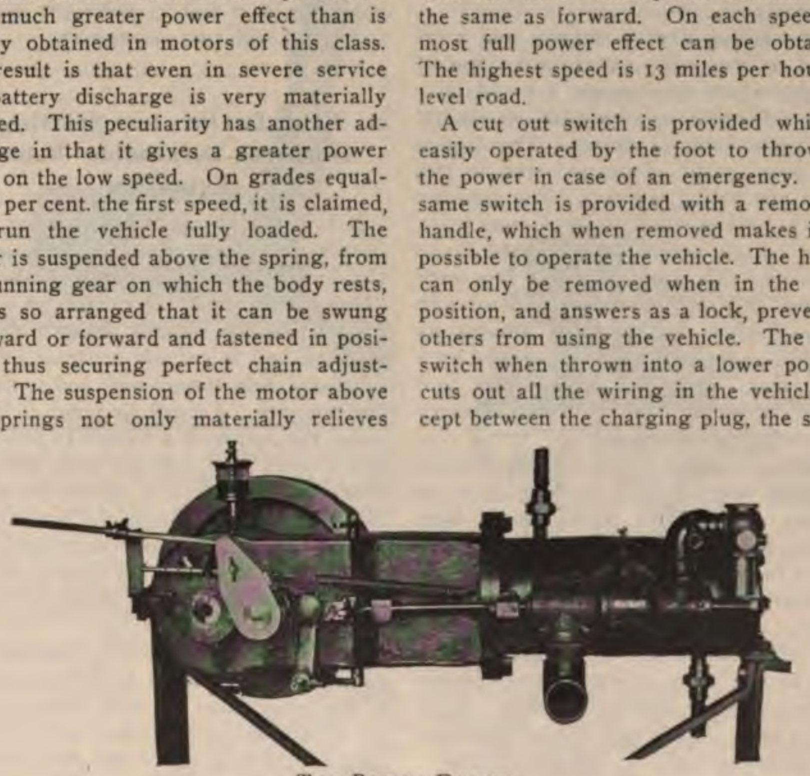
The vehicle is equipped with one Standard Westinghouse vehicle motor. For a vehicle of this size a properly designed differential on the rear axle is practical, which makes it possible to effect a saving by using one large motor instead of two small ones. The design of the motor is such that small rises in current produce a very much greater power effect than is usually obtained in motors of this class. The result is that even in severe service the battery discharge is very materially reduced. This peculiarity has another advantage in that it gives a greater power effect on the low speed. On grades equaling 10 per cent. the first speed, it is claimed, will run the vehicle fully loaded. The motor is suspended above the spring, from the running gear on which the body rests, and is so arranged that it can be swung backward or forward and fastened in position, thus securing perfect chain adjustment. The suspension of the motor above the springs not only materially relieves shocks on it and the running gear, but contributes greatly to the life of the tires, and on account of its location equalizes the load.

The transmission is by a roller chain from the countershaft built into the motor heads to a balance gear on the rear axle. The pull of the chain is taken by distance rods attaching to the side bars of the running gear frame and the main rear axle bearings.

The controller has four speeds and is conveniently located on the end of the seat.

The motor reverses by pressing a lever with the heel. The speeds backward are the same as forward. On each speed almost full power effect can be obtained. The highest speed is 13 miles per hour on level road.

A cut out switch is provided which is easily operated by the foot to throw off the power in case of an emergency. This same switch is provided with a removable handle, which when removed makes it impossible to operate the vehicle. The handle can only be removed when in the "off" position, and answers as a lock, preventing others from using the vehicle. The same switch when thrown into a lower position cuts out all the wiring in the vehicle except between the charging plug, the switch



The Binate Engine.

and the battery; thus anything desired can be done to the motor, controller or wiring while the vehicle is on charge without danger of doing any damage by short circuiting, etc.

Each vehicle is equipped with a charging receptacle, which will fit the standard charging plug most commonly used in this country today. A charging plug with 15 feet of cable is furnished with each vehicle.

Instead of the ordinary volt ammeter, this vehicle is equipped with an indicator which shows directly the proportional amount of energy remaining in the battery. Two electric side lamps are furnished, operated by switches in front of seat. All wiring is said to be acid proof and to be arranged very simply so as to be easily followed by even the uninformed.

The running gears are original in design and of the tubular type. The frame of the gear is made of high grade tubular steel, combining lightness with strength, and so constructed as to relieve the body of the vehicle of all working strains from the motor and power transmission. All springs are elliptical; the front three leaf and the rear four leaf, bolted and clipped to the axles.

The steering is effected by side lever. This form of steering device has been adopted in preference to a centre steering lever for the following reasons:

By experience it has been found that the control of the vehicle is made easier for the operator, and more effective than the centre steering lever.

By means of a knuckle joint the steering lever can be thrown back, making an arrangement much more convenient when passengers are entering or leaving the vehicle than the centre steering lever construction.

The steering lever is tubular and reinforced at its upper end to give special strength where the knuckle is keyed in.

The differential is composed of straight spur gears made of bronze. The case is dust proof, made of pressed steel in two pieces and bolted together. The sprocket wheel is held in place by these same bolts.

The vehicle is fitted with a band brake on the rear axle, operated with a foot lever working on a ratchet. It is also fitted with an auxiliary brake operating directly on the shaft of the motor and controlled by a hand lever. These are probably the first electric vehicles built in this country equipped with two brakes.

The front axle is tubular, reinforced for its entire length. The steering axles or spindles are made of solid steel of high carbon, forged out of one piece, and are said to be of sufficient strength to prevent the wheels from spreading at the bottom. The rear axle is one solid bar of steel, running from one wheel to the other, and fitted with a short sleeve on one side to get the necessary differential effect. Each bearing has a double row of large diameter balls made especially for automobile use.

The wheels are ball bearing, fitted with 30x3 inch double tube pneumatic tires. Each wheel has forty heavy swedged spokes of high tensile strength. The hubs are flanged and fitted with dust proof washers. The track is 4 feet 6 inches centre to centre of tire. All bearings are said to be of ample dimensions.

The designs of all the bodies have been studied from every standpoint known to the vehicle builder, and the bodies are now produced in four different styles. They are hung low and are easy of ingress and egress. The batteries occupy the part in the rear of the seat, over the top of which is neatly fitted a boot, giving a finished appearance and completely protecting them, also providing an opening so that the batteries can be properly cared for without removal from the battery compartment. The front under each seat is removable, making access easy to the electrical parts. Perfect ventilation is provided to allow fumes to escape when charging. The seats are claimed to be comfortable and roomy and trimmed with a fine quality of leather, cloth or whipcord.

The bodies are painted black and the gears red or dark green. Tops are provided with any of the vehicles.

The following is a specification of this vehicle: Track, 54 inches; wheel base, 61 inches; wheel diameter, 30 inches; tires, 30x3 inches; body length, 73 inches; body width, 29 inches; seat width, 33 inches; floor height, 28½ inches; weight complete, 1,350 pounds; motor, 24 ampere, 40 volt Westinghouse; controller, four speeds and foot reverse; battery, 24 cells of 96 ampere hours arranged in two trays, weighing together 550 pounds; mileage, 40 miles with two passengers on one charge; speeds, 3, 5, 9 and 13 miles per hour on level road with two passengers.

A New Device for Starting Up Burners—Detachable Vehicle Extension.

J. F. Hathaway, 31 Chester street, West Somerville, Mass., is the manufacturer of the burner starting apparatus called the "Howard System." It consists of a small copper reservoir holding about a quart of gasoline and is entirely separate from all other gasoline connections and is not under pressure. A small air pump is located under the seat with a handle to actuate it, and a small pipe running from the pump under the carriage to a device for mixing the fuel and air. From the latter to the burner there is a pipe connection. The system is said to be very simple and dispenses with torches, vaporizers or generator attachments.

To raise steam it is only necessary to put a lighted match through the peephole of the burner and to work the air pump for about one minute, when the main gasoline supply may be turned on slowly. As soon as the operator ceases to work the pump the flow of fuel from the system ceases.

DETACHABLE EXTENSION.

Our half-tone engraving shows a detachable vehicle extension invented by Mr. Hathaway as it looks when fitted to a steam carriage. It consists of an inclined footboard, a leather dash, sills and parts that secure it to the frame and the boot in front.

The First American Made Aluminum Body.

A 16 horse power Panhard, owned by T. A. Griffin, president of the Griffin Car Wheel Company, and imported by Smith & Mabley, of New York city, has just been provided with a body made of aluminum by J. M. Quinby & Co., of Newark, N. J. This is said to be the first automobile body to be made from this material in America.

The design is quite new and presents an elegant appearance, besides possessing some practical features.

The tonneau is quite roomy, but when carrying only two persons the remaining seats may be dropped down out of the way. Six or seven persons may be carried in all.

The tonneau is finished in a deep red, relieved with polished brass moldings, and is upholstered in tufted tan leather. The novel mud guards are also of aluminum, which is stitched over an iron frame, the stitch marks showing exactly as in patent leather when it is used for mud guards.

The "Neverout" Acetylene Headlight.

This lamp, now being introduced by the Rose Manufacturing Company, of Philadelphia, contains a number of carbide charges and is therefore termed by its makers the "Magazine Gas Headlight." The charges are connected with the burner successively, as required, affording a prolonged period of usefulness.

The lamps are of full brass, brass and black enamel, nickel and enamel, full nickel, or any color of enamel desired.

The reflectors are of non-tarnishing aluminum.

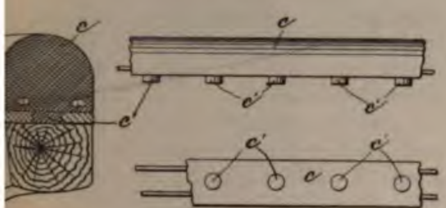
The dimensions are as follows: Extreme heighth, 14¼ inches; diameter of front, 7 inches; extreme depth, 10¾ inches; extreme width, 11 inches. Various smaller sizes are also made.

MOTOR VEHICLE PATENTS..

United States Patents.

705,072. Rubber Tire.—Arthur W. Grant, Springfield, Ohio, assignor to the Con- lidated Rubber Tire Company. July 22, 02. Filed March 23, 1900.

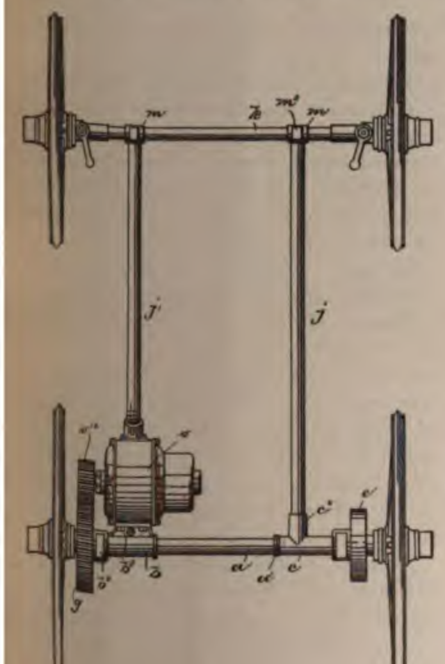
The steel rim is provided with a series apertures around its periphery, and the



tire has a series of corresponding lugs upon its base that fit within said apertures to prevent lateral displacement and creeping.

704,809. Automobiles.—Alvardo S. Krotz, of Springfield, Ohio. July 15, 1902. Filed July 8, 1901.

The invention relates to frame construction, and includes a tube surrounding the axle and having what are termed corner pieces at each end. One corner piece is of T shape and journaled with the tube, also connecting with one of the side bars; while the other corner piece is brazed to the tube and has a forward U shape dropped extension to receive the motor, which latter is hung therein, being pivoted at

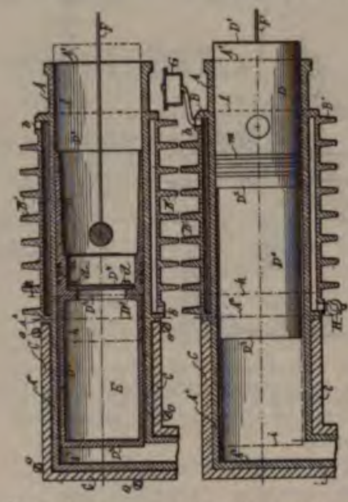


one side and spring supported at the other side.

A convenient means of assembling the parts is claimed, also the ability to promptly replace broken parts.

704,713. Explosive Engine.—Mathias J. Klein, of Baltimore. July 15, 1902. Filed January 17, 1901.

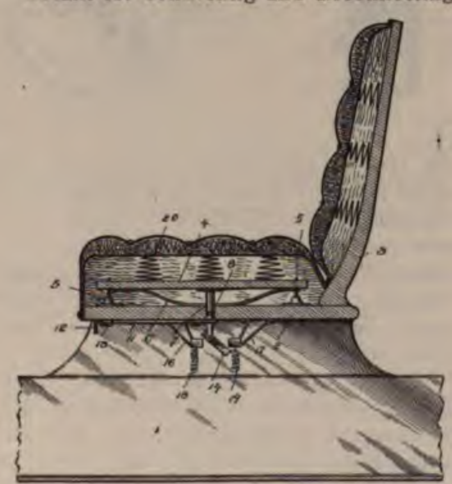
The cylinder and piston are elongated on compression end, a water jacket sur-



rounding the rear portion for cooling and lubricating; the water jacket also having air cooling ribs. The piston is in cylindrical form and its compression end is of slightly less diameter than the inclosing cylinder, permitting the formation of a thin film of gas there-between, to take up heat from the hot walls of the cylinder extension as the piston moves to the left, giving this heat off again to the cooling water in the water jacket on the reverse stroke.

704,616. Safety Device for Motor Vehicles.—Herman Charles, of Kofa, Arizona Territory. July 15, 1902. Filed February 7, 1901.

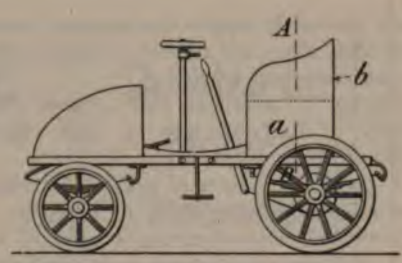
Means for connecting and disconnecting



the motive power of a vehicle by mechanism arranged beneath the seat, with springs, retracted normally for disconnection and compressed by the weight of driver for connection.

704,676. Metallic Chest for Motor Vehicles.—Ferdinand Charron and Léonce Girardot, of Paris. July 15, 1902. Filed April 22, 1902.

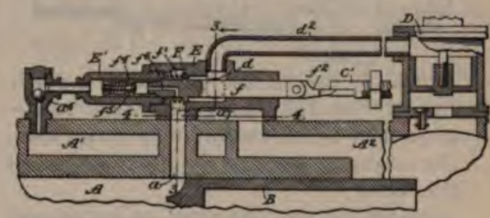
The receptacle for gasoline or other liquid fuel is constructed, together with the carriage seat and back, from two sheet metal plates, one sheet being cut and bent



to form the reservoir and seat back, the other sheet forming the reservoir cover and seat.

704,995. Explosive Engine.—Carl W. Weiss, of New York. July 15, 1902. Filed January 15, 1900.

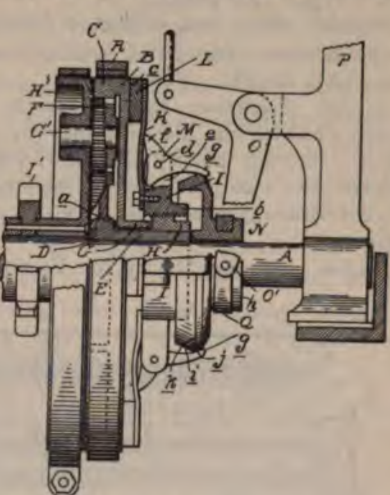
Relates to cooling explosion cylinders by the introduction of a small quota of water in advance of the explosive mixture, its instant evaporization being intended to absorb heat and drive out the dead gases that remained in the cylinder.



The water is supplied from the water jacket, to which connection is made through a stop valve, check valve, regulating valve, and sight feed. The water falls through a port which is closed by the piston, except when the latter is at or near the limit of its forward movement, at which point water is introduced subject to the control of a governor.

704,911. Friction Clutch.—Rawson E. Olds, of Detroit. July 15, 1902. Filed February 25, 1902.

This invention provides means preventing the danger of stripping gears when applying the friction clutch. The pressure blocks that engage with the internal surface of an annular head portion are operated by radial arms, of sufficient strength

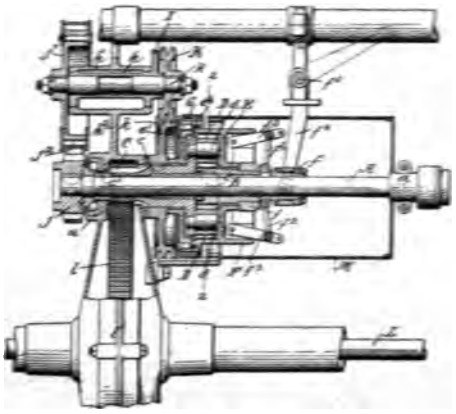


to resist strain in the direction of rotation, but capable of flexing transversely to the plane of rotation. Dogs bear against said spring arms, and a cam head

upon the shaft causes the dogs to press the radial arms into frictional contact with the annular head portion.

704,699. Transmission Gear.—David Ferguson, of Buffalo. July 15, 1902. Filed April 17, 1902.

A planetary system of gearing in which the main feature appears to comprise a countershaft whose bearing is mounted ec-



centrically thereto and adapted to move it to and from the transmission shaft to engage their sprockets for the reverse; also, the means for locking the internal gear to the shaft.

704,689. Steam Generator.—Charles and Arthur Musker and W. G. Hay, of Liverpool, England. July 15, 1902. Filed March 5, 1901.

Fuel oil is vaporized by highly heating air and passing it over and with the oil introduced into the vaporizer. This heated air is forced by a blower (a fan driven by the motor) into a chamber at one end of the generator, opposite the vaporizing chamber, and passes to said vaporizing chamber through intermediate tubes which are subject to the heat of the flames from slits in two horizontal burner tubes.

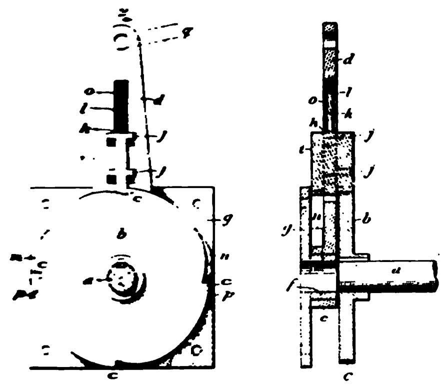
704,645. Differential Speed Mechanism. —Herman R. Isler, Hamilton, Ohio, assignor to Charles F. Hilker, Hamilton, Ohio. Filed November 4, 1901. Serial No. 81,132. (No model.)

704,860. Automobile.—Samuel S. Conant, Edgerton, Ohio. Filed April 26, 1902. Serial No. 104,789. (No model.)

704,739. Secondary Battery.—Justus B. Entz, Philadelphia, Pa., assignor to the Electric Storage Battery Company, Philadelphia, Pa., a corporation of New Jersey. Filed October 3, 1900. Serial No. 31,903. (No model.)

704,618. Starting Device for Explosive Engines.—Caleb F. Cope. July 15, 1902. Filed December 17, 1900.

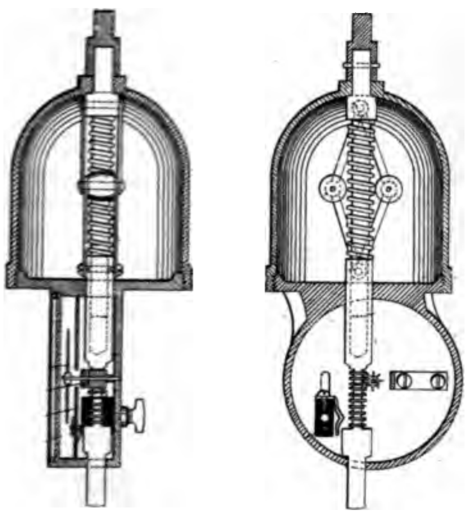
Relates to means whereby the starting



crank is automatically freed from the motor shaft as soon as the engine starts in operation.

705,514. Speed Gauge.—H. S. Credlebaugh, of New Carlisle, Ohio. July 22, 1902. Filed July 15, 1901.

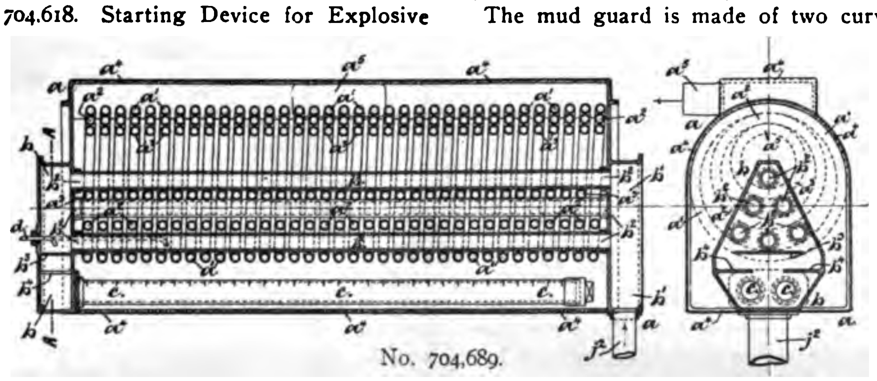
The invention relates to a speed gauge



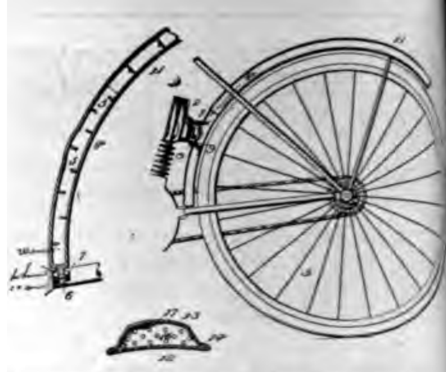
for visually and audibly ascertaining the speed at which a vehicle is running. The essential features of the device are a friction pulley which runs on the hub of a wheel, flexible shaft, ball governing and recording device and dial. When the legal speed limit is reached an electric bell gives the alarm.

705,357. Combined Muffle and Mud Guard for Motor Vehicles.—Robert M. Keating, of Middletown, Conn. July 22, 1902. Filed December 23, 1901.

The mud guard is made of two curved



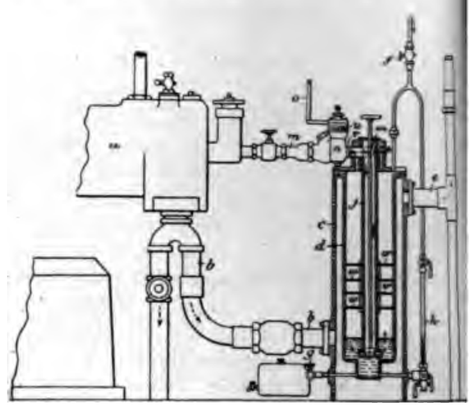
No. 704,689.



plates clamped together, the outer one having a greater curvature, thus providing an inner space through which the exhaust is passed. Its interior is provided with the usual baffle plates.

705,021. Carburetor.—James F. Bennett and Hedley S. Moorwood, of Sheffield, England. July 22, 1902. Filed March 10, 1902.

Liquid hydrocarbon is injected into an air supply pipe, which delivers the air so



carbureted in minute streams beneath the surface of a quantity of heated liquid hydrocarbon. The air being thus brought into intimate contact with the mass of hot liquid is completely carbureted, while the mass of liquid does not become exhausted of its more volatile constituents. The result is said to be a vapor of constant quality and free from liquid in suspension.

704,744. Electric Accumulator.—Hermann Heinicke, Schoeneberg, near Berlin, Germany. Filed April 28, 1902. Serial No. 105,058. (No model.)

704,751. Manufacture of Secondary Battery Plates of the Planté Type.—Harold M. Martin, Philadelphia, Pa., assignor to the Electric Storage Battery Company, Philadelphia, Pa., a corporation of New Jersey. Filed July 30, 1901. Serial No. 70,259. (No model.)

705,177. Vehicle Wheel.—Charles H. Wheeler and Franklin W. Kremer, of Akron, Ohio. (Wheeler assignor to India Rubber Company.) July 22, 1902. Filed May 4, 1900.

705,304. Motor Vehicle.—Charles T. B. Sangster, of Birmingham, England. July 22, 1902. Filed February 24, 1902.

705,489. Motor.—John Ulrich, of Columbus, Ohio. July 22, 1902. Filed October 28, 1901.

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Obstacle Races.

The obstacle contests which formed one of the features of many of the earlier automobile events have lost considerable of their interest. These contests were held either indoor on the occasion of exhibitions or on smooth roads or tracks, and the obstacles which the competitors had to avoid were of a class entirely different from those met with in actual traffic. It was found that the conditions governing success in such a contest were not at all similar to the conditions of success of a vehicle in actual traffic, and this class of contest has therefore been abandoned more or less owing to its impractical nature. For instance, it was found that a machine with short wheel base could make its way easier through the succession of obstacles than a long machine, whereas road requirements demand a long wheel base. Similarly a light machine with direct lever steering could be handled with greater facility than a heavy machine with a steering gear comprising a reduction gearing. Nevertheless the tendency at the time, abroad at least, was toward the latter type of vehicle.

It will thus be seen that an obstacle contest is not really a practical test of vehicles. While manageability is undoubtedly a desirable quality, the attainment of extreme manageability on a good surface calls for sacrifices in other qualities that cannot be made in road vehicles.

Now the obstacle race is brought to the front again as a competition of drivers' skill, and it is stated in a communication of the racing committee of the Long Island Automobile Club, relative to the obstacle race that is to be one of the features of the Brighton Beach races this month:

"Dexterity, rapidity of thought, judgment and calculation are the qualities most called for in a competition event of this class. The operator who is accustomed to threading his way through the crowded city thoroughfares, and who has more or less often crossed the Brooklyn Bridge, is the one who, if he drives a light car, should be able to win the prize. This event should prove instructive to the public, as demonstrating the ready control and thorough mastery of his car by the driver who is frequently met with in the congested portions of the city; as, for instance, Broadway, with its endless stream of cars, trucks and vans, or Fifth avenue, above Thirty-fourth street, presenting its continuous procession of stages, pleasure vehicles and automobiles of all types."

The effort of the club to discover some useful feature in the event is commendable. It is questionable, however, whether the prize will go to the driver who actually is most skillful, as the result must in each case depend upon the manageability of the machine, and as the various vehicles differ greatly in this respect.

Plante Versus Pasted Electrodes.

The present storage battery situation in the United States hardly furnishes any clews as to the relative suitability of the two general types of lead storage batteries for automobile work. Of six leading manufacturers furnishing storage batteries for automobiles, four employ electro-mechanical processes in the formation of the electrodes, while only two construct their plates on the Fauré or pasted system. While this would seem to indicate a preference for batteries with Planté electrodes, it must not be forgotten that the construction of battery electrodes on the pasted system is broadly covered by a patent or patents owned by one of the two companies referred to above as employing this form of electrode, and that at least one of the manufacturers of Planté type electrodes has changed to that type after having been enjoined by the courts from continuing the manufacture of pasted plate batteries.

It is generally admitted that Planté plates, formed of a solid sheet of lead, have a longer life than pasted plates. On the other hand, the same capacity per unit of weight cannot be obtained with the former as with the latter, and all "long distance on one charge" records have been made with pasted electrode batteries. These facts suggest that it is largely a matter of conditions of vehicle use which one of the two types is the more suitable in any particular case. There are many owners to

whom a slightly increased cost of operation (owing to the higher depreciation of the pasted electrode) is no object, and who would greatly appreciate an increase in mileage or radius of operation, while a majority, no doubt, would favor the "long life" battery if it gave a mileage capacity commensurate with their requirements. The course the manufacturers will pursue after the expiration of the Brush patent next year may furnish some information as to which type of plate has proved the more generally satisfactory for this class of work, while no conclusions in this regard can be drawn from the present tendencies of the industry, owing to the patent complications.

Of some interest in this connection is a recent accumulator competition conducted by the French Navy Department. The department employs storage batteries especially for submarine boats, and there the working conditions are somewhat similar to those in automobiles. The rate of discharge is high and the weight for a given capacity must be a minimum. Only the mechanical vibration to which automobile batteries are subjected calls for greater mechanical strength of the latter.

Now, the most striking feature in looking over the list of entries in this competition is that about two-thirds of the batteries entered had positive plates of Planté formation and pasted negative plates. It has thus evidently been attempted to combine, as far as possible, the high capacity of the pasted plate battery with the durability of the Planté battery. The positive electrodes are always subjected to the most intense strains and deteriorate therefore the quicker. It is therefore quite logical to employ the more durable Planté plates for positive electrodes, and at the same time try to save weight in the negatives by making these of the pasted type.

It is not unlikely that after the field has been cleared of patent restrictions the rivalry between the Planté and pasted batteries will end in a compromise; i. e., the use of both kinds of plates in the same battery, as described.

Poppet Valve Proportions.

The question of the proper relation between diameter and lift of poppet valves has lately been raised in these columns. In some respects this question seems to be a very simple one, as the assumption is easily made that the cross section of the valve passage should be th- point. If this as- clusion is arrived at that if the reduction of the passage by the valve stem is neglected the lift should be one-quarter the clear diameter of the valve passage. If the effect of the valve stem is taken into account the lift can be made slightly less than one-quarter the diameter.

There is another consideration, however, which must be taken into account in the design of such valves, and which has in the case of some high speed engines led to entirely different proportions between valve diameter and lift than that indicated above. We refer to the power required to promptly open and close the valve.

The time in which a valve of this kind is closed depends upon the weight of the valve, the strength of the spring and the lift. If the time available for closing the valve is fixed then the spring must be stronger the greater the lift of the valve. Now supposing that a spring could be made satisfying the requirement of prompt closing in even a high speed engine, the use of such a spring would be objectionable, as the powerful impulses to which the cam and the spring alternately subject the valve stem would rapidly crystallize the material of the latter and result in breakage of same. By increasing the diameter of the valve, the lift can be reduced without reducing the effective valve passage, and the strain on the material of the valve stem is reduced, as the stem is, of course, increased in diameter in proportion to the valve head.

In slow speed engines the theoretical proportion of one to four between lift and diameter of valve is undoubtedly the best. At what speed of revolution this proportion ceases to be the best is a question. The only disadvantage in increasing the valve diameter seems to be that if the valve becomes leaky the trouble will be greater in proportion to the valve diameter.

Summer Touring Experience.

Although the weather has not been very favorable so far this summer, many automobilists are now making tours in the country in their vehicles. The spring and fall are perhaps the seasons when the country is at its best, from the standpoint of city dwellers, but many who are regularly occupied in business find it more convenient to take their vacation in midsummer, and this accounts for the general preva-lence of automobile touring just at the -e of which there are many in-

This summer will therefore greatly add to the stock of experience of the automobile public, and, we hope, also to the popularity of automobile touring and automobiling generally. Many valuable lessons will no doubt be learned by automobilists when, for instance, their machines are in want of repairs far away from a well equipped machine shop, and we would like to hear from any of our readers who may meet with some interesting experience during their summer tours. Automobilists always like to read of the experiences of their colleagues—how they enjoyed their trips, what trouble they had to contend with, and, especially, how it was remedied. A knowledge of how to cope with troubles and breakdowns on the road is one of the prime essentials to successful automobile touring. May those who can speak from experience do their share to help spread such knowledge!

Facilitating Repairs.

When an automobilist is on an extensive tour—and for that matter also under ordinary conditions—he sometimes finds it necessary to send to the factory for repair parts. While touring it is especially desirable that there should be the least possible delay caused by waiting for such repair parts and protracted delays caused by a misunderstanding on the part of the factory as to what part is wanted are especially annoying. As a rule automobilists are not very conversant with technical terms and names of parts, and confusion is quite apt to arise in this matter.

In order to avoid such possibilities a number of French automobile manufacturers now designate each small part of their machines by a number and issue a list of the parts, giving both the name and the number of each, and give a copy of it to every purchaser of a vehicle. The list is illustrated with views of the mechanism and parts, and the number of each part is marked on the illustrations. It will be readily seen that such a system is a great convenience to both the automobile owner and the factory.

As in other branches of manufacture, it is also becoming the custom with the larger automobile factories to make all cast and drop forged parts with numbers by which these parts are designated. These numbers, while primarily intended for convenience in the shop, are also useful to the automobilist in case a part so provided is broken and has to be replaced by a new one.

An American Automobile Congress.

We are glad to note that the suggestion made in these columns recently that a congress of American automobilists would be likely to prove of some benefit to the movement and the industry, and was therefore desirable, has been taken up by the daily press. One of the New York dailies states that the suggestion has been received favorably by manufacturers and sportsmen interested in the spread of the auto's influence, and in the forwarding of new and more favorable legislation. There are undoubtedly many points of public policy that could be threshed out at such a convention.

English Imports of Automobiles.

In the month of April there were imported into British ports automobiles aggregating in value $615,725. The vehicles were imported from Austria ($1,800), Belgium ($39,755), France ($482,145), Germany ($4,000), Holland ($22,955), and the United States ($64,970.) The list of imports from the United States is as follows:

Shipped From.	Description.	No.	Value.
Boston..........	Steamobile..............	1	$1,200
"	Motor cars	2	1,500
"	" car parts........	..	100
"	" cycles	1	230
"	" cars	3	3,125
New York......	" cars	2	1,550
"	" car parts........	..	200
"	" cars	2	3,000
"	" cars	5	4,750
"	Locomobiles	42	30,335
"	Locomobile parts	..	1,000
"	Motor car parts.......	..	1,820
"	" cars	16	13,210
"	" car parts	..	2,365
"	" cycles..........	2	565
Total value of imports for April, 1902........			$64,970
" " " " four months 1902.			125,780

A Technical Dictionary.

The Society of German Engineers purposes to publish, in the English, German and French languages, a technical dictionary, which it has termed the "Technolexicon." It is not intended to be an encyclopædia, but a dictionary pure and simple, which is to embrace all the technical branches of industry. Any person connected with any industry may become a collaborator by communicating with Dr. Hubert Jansen, the secretary of the society, Berlin (N. W. 7), Dorotheenstr. 49. Parties conversant with the terms and expressions employed in the industry with which they are connected will serve a good cause by contributing to this dictionary. The circular which we have received states expressly that "Contributions in only one language (without translation of the terms given) are also of the greatest value for the 'Technolexicon.'"

A question blank and notebooks will be sent to all intending collaborators to facilitate their work.

The society is taking a step in the right direction and it is to be hoped that manufacturers' associations in the United States and individuals also will do all in their power to assist in the work. The dictionary, no doubt, will become a standard work, and will be of great value in the translation of technical and business literature, such as catalogues of machinery, which for want of such a book have heretofore been so poorly done.

The Oldsmobile Carburetor, Gasoline Feed and Valve Arrangement.

A number of the general features of the Oldsmobile were described in an article in THE HORSELESS AGE some months ago. We herewith publish some drawings of details connected with the engine which were not considered in that article.

Fig. 1 illustrates the carburetor. The air enters the chamber through the pipe on the right and passes straight through it and out of the opening on the left. The gasoline arrives by a small tube connecting on top of the device, and is fed into a conical tube of fine mesh wire gauze. The flow of gasoline can be regulated by means of a needle valve N. The air in passing around the gauze tube becomes saturated with vapor from the gasoline, and is then caused to flow through a throttle valve V operated by means of a foot lever through the intermediary of the bell crank B.

The main gasoline supply tank is fixed at a lower level than the carburetor, and any surplus gasoline from the carburetor returns to the tank by gravity, as may be seen from Fig. 2, which illustrates the method of feeding the gasoline.

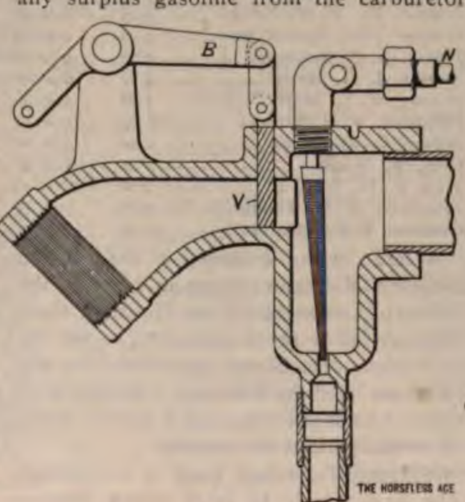


FIG. 1.

Referring to Fig. 2, A is a diaphragm pump, one compartment of the diaphragm chamber of which is in communication with the closed crank case of the motor. The other compartment communicates with a fitting in the gasoline tank containing two ball valves. When the motor is in operation the diaphragm is vibrated in unison with the strokes of the piston by the suction in the crank chamber, and gasoline is thereby pumped from the main tank into an auxiliary tank B located higher than the carburetor. From this tank the gasoline flows to the carburetor by gravity. The auxiliary tank B forms the upper part of a vertical cylinder extending down into the main gasoline tank. A piston provided with a stem and handle is arranged in this cylinder, and the object of this arrangement is to allow the operator to pump

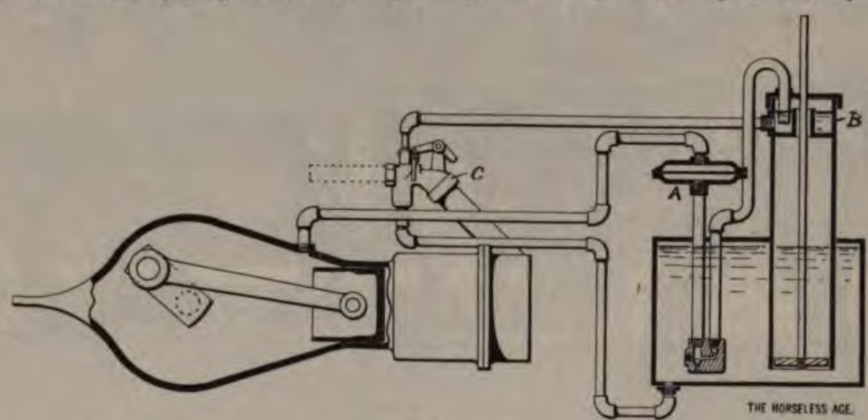


FIG. 2.

gasoline into the auxiliary tank by hand when starting.

From Fig. 3 it will be seen that both the intake and exhaust valves of the Oldsmobile

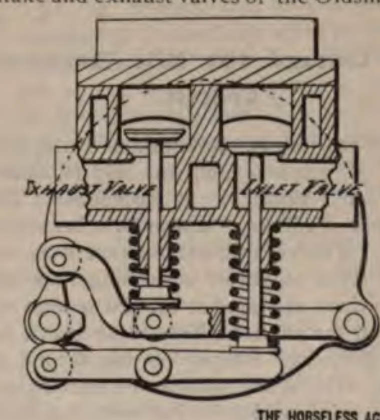


FIG. 3.

engine are mechanically operated. The cam shaft, which is operated by means of spiral gears, runs longitudinally with the engine on the exhaust valve side. Both valves are located in the head of the engine. The exhaust valve is operated by means of a single armed lever, which is forked to pass the admission valve. The latter is operated by means of a double armed lever pivoted below the exhaust valve.

SCENE IN FRONT OF THE CLUBHOUSE BEFORE THE START.

The Chicago 100 Mile Endurance Contest.

The 100 miles endurance run of the Chicago Automobile Club was held on Saturday last, August 2, as scheduled. The number of entries is said to have been over forty. Twelve automobiles that were entered failed to report at starting time, but nine others appeared at the last minute and entered the contest. Two turned back before they had entered on the second 15 miles. The actual number of starters was twenty-nine, which is, however, not at all a bad showing, considering the season and other unfavorable factors. Following is a list of the starters and the time of start and finish:

Make and Operator.	Start.	Finish.
Winton, Frank X. Mudd	9:06	4:22:35
Winton, John E. Fry	9:07	4:23:38
Autocar, F. Illsley	9:08	4:23:40
Olds, Roy D. Chapin	9:09	5:11:39
Pierce, P. P. Pierce	9:10	5:11:40
Jeffery, Arthur Gardener	9:11	4:24:15
Olds, E. A. Brown	9:12	6:48:00
Knox, C. S. Mason	9:13	4:27:05
Loco, S. B. Arnold	9:14	8:44:00
Loco, J. W. Sunderland	9:15	......
Elmore, I. F. Newcomer	9:16	......
Packard, F. J. Pardee	9:17	4.32:47
Holsman, J. A. Holsman	9:18	9:46:00
Northern, J. D. Maxwell	9:19	5:12:30
Loco, C. A. Benjamin	9:20	5:21:45
Winton, C. E. Bentley	9:21	4:44:55
Olds, M. E. Haywood	9:22	6:09:45
Darracq, A. C. Banker	9:23	4:58:53
Winton, Dr. F. H. Davis	9:24	5:29:58
Winton, John Farson, Jr.	9:25	4:40:05
Jeffery, S. F. Symons	9:26	4:43:10
Murray, J. H. Mears	9:27	6:38:00
Murray, W. G. Murray	9:28	4:43:00
Friedman, R. R. Brown	9:29	5:28:32
Jeffery, C. T. Jeffery	9:30	4:41:10
Olds, M. Wigles	9:31	5:33:50
Wolf, F. W. Wolf, Jr.	9:32	......
Friedman, B. M. Young	9:35	......
Fanning, F. J. Fanning	10:45	......

A large crowd gathered at the starting place on Michigan avenue in front of the Chicago Automobile Club House, a short distance below the Auditorium, to see the contestants off. Scores of automobiles and carriages lined the driveway, carrying spectators who seemed to have a special interest in the various contestants.

R. Harry Croninger acted as timekeeper. The first vehicle to leave was a Winton touring car driven by F. X. Mudd, treasurer of the Chicago club, and he was cheered by the crowd that witnessed the start. John E. Fry, with another Winton touring car, got away second, and Frank P. Illsley, with an autocar, third. The cars turned west from Michigan avenue, along Jackson boulevard to Ashland avenue, thence north to Washington boulevard and west to Harlem avenue in Oak Park.

News of the coming of the contestants traveled fast, and wherever the machines appeared on the trip a crowd awaited them. Through Oak Park, Harlem and Desplaines the streets were lined.

On in the country the farmers apparently took a day off to see the race. They stood out in the front yards, sat on the fences or on the ground, surrounded by their wives and children. Frequently a farm would be passed where a half dozen men held horses with their noses pointed toward the road so they would become better acquainted with the machines and cease to fear them.

Among the contestants was Stanley Arnold, a thirteen year old boy, who drove a locomobile. He was recently refused a

Chas. E. Barkley (No. 24) Starting.

driver's license by the city licensing bureau, and so he drove without the required document. As far as is known the only stops he made were for water and gasoline, but some stops for supplies had to be made outside of control stations. Before he reached the first control he stopped twenty-eight minutes for water. Eighteen minutes were consumed at Wheeling in getting water. Between Gurnee and Waukegan the gasoline gave out and he had to hire a boy to cart a new supply three-quarters of a mile, thereby losing one and one-half hours. Further stops were made at Highland Park and Evanston.

F. W. Wolf, who drove No. 20, broke his transmission gear at Washington boulevard and Forty-eighth avenue and turned back. J. W. Sutherland of No. 22 found his machine working unsatisfactorily and turned back at the end of the first 15 miles. James E. Fry of No. 2 broke a spring near Wheeling, but patched it up and finished inside the time limit. R. G. Chapin burst a tire on the "out" trip near Waukegan, and had a thirty-five minute allowance taken out while he repaired it. J. D. Maxwell of No. 28 had trouble at Gurnee, which detained him a few minutes.

At Oak Park—By a Representative.

The first car in the 100 mile Endurance Contest reached Oak Park at 10:35, and for an hour the vehicles continued to come through. Everything was lovely, the weather included. No. 23 was missing explosions very badly; No. 24 had its pump belt off and dragging on the ground; No. 35 was making a large amount of noise; No. 1, a Winton touring car, ran the 100 mile trip with the muffler cut out; No. 32, Winton touring car, was running at about 35 miles an hour, going through Oak Park, and used the horn continuously. All the other cars were running very smoothly. The Rambler cars made a very good impression.

I next took a position on the Hubbards Wood Hill, about half way up. This hill is about 23 miles from Chicago, on the return route. The first and second arrivals at this hill were Winton touring cars, Nos. 1 and 2. The third was an auto car, No. 4; time, 2:35 o'clock. After these cars had passed there was an intermission of about twenty minutes before the following arrived, which made their appearance before 4 o'clock:

No. 14. Rambler, climbed hill on low gear, very hard work.

No. 18. Knox, climbed hill on high gear, very easily.

No. 13. Packard, climbed hill on low gear, very slow.

No. 32. Winton Touring Car, climbed hill on low gear, very easily.

No. 24. Winton Touring Car, climbed hill on low gear, very easily.

No. 15. Rambler, climbed hill on low gear, very hard work.

No. 16. Rambler, climbed hill on low gear, very hard work.

No. 34. Murray, climbed hill on low gear, very hard work.

No. 6. Olds, climbed hill on low gear, very hard work.

No. 9. Pierce, climbed hill on low gear, very hard work, lots of noise.

No. 28. Northern, climbed hill on low gear, very hard work.

No. 29. Darracq, climbed hill on low gear, very hard work.

No. 31. Locomobile, climbed hill on low gear, very easily.

No. 35. Friedman, had hard time to climb hill.

No. 1. A Winton Touring Car and No. 18, a Knox, were the only cars to climb the hill on the high speed gear.

No. 24, Winton, had broken something underneath (looked like a brake rod), and it was dragging. On No. 28, Northern, one spring was loose from the car body on the right hand side; No. 35, Friedman, had to let the engine run free several times in order to climb this hill. After the driver had the engine at top speed he would throw in his friction drive.

On my way back to Chicago I saw a Winton (No. 30) stopped to fill the water tank.

No. 31, Locomobile, was stopped, and the occupants said they were ahead of time; No. 35 was off the course in Evanston; No. 6 was loafing near Lincoln Park.

I just had a telephone message from Waukegan. A Fanning machine and a Packard are still up there (8:30 p. m.). Fanning could get no power out of the engine and Packard had trouble with the transmission; No. 23, Holsman car (looks like a large buggy with engine under seat), broke down this side of Libertyville; No. 8, an Elmore, is reported as being on fire south of Waukegan.

Will sum this up by saying that there

Getting Ready to Start. Looking South on Michigan Avenue from Clubhouse.

were very few machines entered in this run, as the general impression was that it was a very good "ad." to the manufacturer and no glory to the owner. The majori y of the papers printed the name of the machine entered, but forgot the owner.

One thing more—the manufacturer ought not to be permitted to run a special car over the course. The car ought to be a standard machine run by its actual owner, and if a car is a four passenger machine it should carry its full complement of passengers. Because the tonneau is removed that does not make it a two passenger car. I believe these endurance contests should be held by the club members that have owned their car more than a month, and it would then be as much a personal contest as one of cars.

By Henry Nyberg.

The writer took a position along the route not far from Waukegan, where there was a sandy stretch in the road, to observe the behavior of the machines on this stretch. I found, however, that the sand was not very deep, and the large cars, with their 4 inch tires, plowed the sand away and made the road good and hard for the smaller vehicles behind which followed in their tracks. Nothing of importance happened within view. When hearing of No. 8 being on fire I went down there on my wheel, but too late to see anything more than the truck, which was later towed into the fourth control. Mr. Newcomer's (the operator) face was scorched some while he was trying to remove the gasoline tank from the vehicle, and in trying to clear the road, which was very narrow at this place.

The list of arrivals at the Waukegan control was as follows:

No. 1	1:23
No. 2	1:23
No. 4	1:24
No. 14	1:25
No. 18	1:27
No. 7	1:33½
No. 13	1:34
No. 8	1:34¼
No. 29	1:37½
No. 32	1:40
No. 15	1:41½
No. 34	1:44½
No. 24	1:45
No. 16	1:46
No. 9	1:47¼
No. 31	1:54½
No. 35	1:59

When S. F. Symons passed through Highland Park, close behind John Farson, who drove a touring car, he was arrested for violating the speed limit. He is said to have been racing with Farson, and was compelled to slow up while the latter took a curve in the road. During this momentary reduction of speed the authorities arrested him. Symons was required to deposit $5 to insure his return, and was let go after a delay of five minutes. A by-

Explaining the Rules.

Fred Pardee Turning Into Yard at the Finish.

stander remarked to the marshal who made the arrest that Symons was not going nearly as fast as the driver ahead of him, to which the marshal replied:

"Yes, but I caught him and I didn't catch the other fellow, and he'll have to pay for it."

A serious accident happened to the Elmore vehicle. After making a perfect run to Waukegan the gasoline suddenly burst into a fierce blaze, and almost entirely destroyed the automobile before Newcomer and Peterson, the occupants, could subdue it, which they did with a fence rail, it is reported. The accident is more or less of a puzzle, but it is thought that a gasoline pipe broke. Neither of the occupants was hurt, as was reported in the Chicago papers.

The first to arrive at the finishing control was F. X. Mudd, who was also the first to start. Having started at 9:06 and finished at 4:22 his time for the whole distance was 7 hours 16 minutes. Both he and his official observer had taken their coats off and were covered with dust. He turned into the yard leading to the barns amid loud applause. One-fifth of a minute behind him came Charles H. Tucker and his observer in their Winton. They also came in for their share of applause. That was at 4:22 1-5. There was a wait until 4:25, when W. G. Lloyd's auto, driven by Frank Illsley, put in an appearance and gave the enthusiastic spectators a chance to cheer again. As the cars arrived members of the club surrounded each vehicle and closely examined its condition after so arduous a journey. Nearly all were found to be in excellent condition, and much interest centred in the Friedman machine, a Chicago product, which is said to have covered the course without a stop.

As soon as the contestants arrived their machines were turned over to the officials, who examined them for breakages, and measured the gasoline consumed on the journey.

The exceedingly small quantities of gasoline consumed by the autos were a surprise even to the officials who made the measurements. F. X. Mudd's Winton touring car consumed 6⅞ gallons of gasoline, and is said to have completed the journey without a stop or hitch. Arthur Gardener's Jeffery carriage also made a perfect run, and consumed 4 gallons of fuel. An Olds machine, driven by R. G. Chapin, made the 100 miles with only 3⅞ gallons of gasoline, but was compelled to make several stops on account of tire troubles.

The club offered a silver cup to the member of the club making the highest score, and the same sort of a cup to the outsider with the best score. In addition to these cups the prizes were red, yellow and white ribbons, with certificates in the order mentioned. It is thought that the cup for club members will go to F. X. Mudd, and the cup for outsiders to P. P. Pierce.

Of the twenty-nine starters twenty-two got back within control time, and all but three or four finished.

OFFICIAL AWARDS.

Operator.	Make.	Per Cent.	Ribbon.
F. X. Mudd	Winton.	100	Blue.
C. S. Mason	Knox.	100	Blue.
M. Wigle	Olds.	100	Blue.
F. J. Pardee	Packard.	100	Blue.
P. P. Pierce	Pierce.	100	Blue.
John Farson, Jr.	Winton.	100	Blue.
C. A. Benjamin	Locomobile.	100	Blue.
Roy D. Chapin	Olds.	100	Blue.
S. H. Arnold	Locomobile.	100	Blue.
F. J. Illsley	Autocar.	99	Red.
Arthur Gardener	Rambler.	99	Red
R. R. Brown	Friedman.	99	Red.
J. D. Maxwell	Northern.	99	Red.
S. F. Symons	Rambler.	98	Red.
C. T. Jeffery	Rambler.	97	Yellow.
M. E. Haywood	Olds.	93	White.
Chas. E. Barkley	Winton.	93	White.
* J. H. Mears	Murray.	90	......

* Very highly commended.

RESULTS OF FUEL CONSUMPTION CONTEST.

No.	Make	Consumption Galls.	Remarks.
1	Winton	$6\frac{7}{8}$	
2	Winton	$10\frac{3}{4}$	Not filled when starting.
4	Autocar	$5\frac{3}{4}$	
6	Olds	$3\frac{7}{8}$	
9	Pierce	$3\frac{1}{4}$	
13	Packard	$6\frac{3}{4}$	
14	Jeffery	$3\frac{1}{4}$	
15	Jeffery	$4\frac{3}{4}$	One-half gallon in overflow to be deducted.
16	Jeffery	$4\frac{7}{8}$	
18	Knox	$7\frac{3}{4}$	
24	Winton	$7\frac{1}{4}$	
27	Olds	$4\frac{3}{4}$	
28	Northern	$4\frac{1}{2}$	
29	Darracq	$6\frac{3}{8}$	Four gallons were taken on en route.
30	Winton	$6\frac{3}{8}$	
31	Locomobile	$9\frac{7}{8}$	Five gallons were taken on en route.
32	Winton	$7\frac{3}{8}$	
33	Murray	—	Filled with $2\frac{1}{4}$ gallons, and could not fill extra tank.
34	Murray	$4\frac{7}{8}$	Three gallons taken on en route.
35	Friedman	$9\frac{1}{4}$	
38	Olds	$4\frac{1}{2}$	

There was a good deal of disappointment among some of the participants when the results of the judges' work were announced. Not as many blue ribbons were awarded as had been expected. It is only fair to state here that the roads were not at all in good condition, but were hard and rough, and therefore especially severe on the light machines, which predominated.

The two cups were awarded to Messrs. Mudd and Pierce respectively, as foreshadowed above. For a time the judges thought that John Farson, Jr., who also made 100 per cent., would divide honors with F. X. Mudd, but it was discovered that while John Farson is a member of the club, John Farson, Jr., is not. Mr. Mudd was the only regular member who finished with a perfect record.

Percy P. Pierce had driven his motorette all the way from Buffalo. His record in the contest was considered perfect in that he did not even make non-penalized stops. C. S. Mason was his closest rival for the non-members' cup, but lost because he reached the finish mark 55 seconds too soon after having been 10 seconds behind time at the sixth control.

First place in the gasoline consumption contest was also taken by Mr. Pierce's machine. He made the run using only three gallons and one quart of gasoline, while the average amount was six gallons and one quart.

In discussing the speed at the contest, Timer Miles said: "The trouble with nearly all of the twelve finishers who did not get certificates was that they went too fast. The rule was that if behind at a control point, they were not to make up time in reaching the next. But in almost every case the control observers' reports show that they did some scorching."

Two of the men who received red ribbons, namely, Maxwell and Brown, missed the blue by a point on account of trouble with their gasoline supply. Mr. Brown's was specially tantalizing, as his only penalized stop came just in front of the Auditorium Annex on the finish stretch.

The judges worked all afternoon Sunday on the reports of the observers who went in the cars and the observers at the controls. Timer Miles submitted each case to the other judges anonymously. The report issued at 6:30 was signed by Edwin F. Brown, referee; Walter H. Chamberlain and S. A. Miles.

As one of the incidents of the start it is reported that Paul Picard, the Chicago club member, insisted on having his chauffeur sit next to him on the drivers' seat, and when it was pointed out to him that this was against the rules and would not be allowed he turned away and refused to start.

500 Mile Reliability Run—New York to Boston and Return.

Secretary S. M. Butler, of the A. C. A., sends out the following notice relative to change in date of this contest:

The Automobile Club of America will hold a 500 mile reliability run to Boston and return, starting from the clubhouse, at Fifty-eighth street and Fifth avenue, New York, on Thursday morning, October 9, 1902. The route will be via Norwalk, Bridgeport, New Haven, Hartford, Springfield and Worcester, arriving at Boston on the afternoon of Saturday, October 11. Sunday will be spent in Boston, the start on the return trip being made on Monday morning, October 13, over the same route, arriving in New York on Wednesday afternoon, October 15.

Each vehicle will carry an official observer, who will be provided by the club.

The run will be open to all classes of self-propelled vehicles made in the United States or abroad.

Rules and regulations will be announced later.

A. C. A. Institutes a Register of Mechanics.

Secretary S. M. Butler is sending out the following notice:

For the protection of members a register for mechanics has been inaugurated by the club, and will contain, so far as possible, a list of eligible and reliable operators.

To this end you are invited to send to the club secretary the name of your mechanic to be entered in the register, and should you have occasion to discontinue his services for cause, you are requested to immediately notify the club secretary.

which information will be considered confidential.

You are also invited to send us the name of any mechanic whom you know to be a competent and trustworthy man.

Members desiring to engage mechanics can apply to the club secretary, who will furnish the names of men whose record has been investigated.

Benevolent Assimilation of Motor Cyclists.

The L. A. W. has decided to annex the motor cyclists, or to take them under its protective wings. This action takes the form of a resolution enacted by the executive committee of the organization declaring that riders of motor bicycles have "common cause" with riders of motorless bicycles, and pledging the strength of the league to secure them the same rights and privileges. It is stated with regard to this resolution that motor cyclists have been in doubt as to the league's attitude toward them, and now it is made plain an infusion of new blood and a general reinvigoration of the L. A. W. is likely. One immediate result doubtless will be the accession of the Associated American Motocyclists, an organization with national pretensions, formed some three years ago, and before motor cycles had gained strength or popularity. It is probable also that the various motor cycle clubs throughout the country will now affiliate with the L. A. W. and ultimately prove a power in its councils, since the rights and status of motor bicycles are not clearly defined and are menaced or disputed in several localities in much the same manner that those of the original bicycle were menaced.

The North Shore Automobile Club.

An automobile club with the above name has just been formed among residents along the North Shore in Massachusetts, and is said to include practically every automobilist in Beverly and Manchester. The officers are: Walter D. Denagre, of New Orleans, president; Dr. C. T. Parker, of New York, vice president, and Q. A. Shaw, Jr., of Boston, secretary and treasurer.

The object of the club is to make automobile riding safer in tree shaded paths and crowded thoroughfares. The members have agreed not to drive over several wood roads through Manchester and around Chebacco Pond at Hamilton and Essex. Every automobile owned in the club is numbered and a list of the owners and their numbers is left with the police officials in Beverly and Manchester, so that if any case of excessive speed is reported it will be easy to ascertain whether the offender was a club man or not.

The club had an informal run on Sunday, July 27, and despite the disagreeable weather quite a number turned out, starting from Gerard Bennet's place at West Manchester, and going to Turk's Head Inn, on Land's End, Rockport, where dinner was served.

...COMMUNICATIONS...

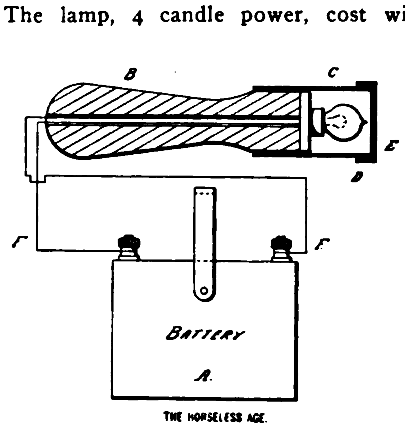
Portable Inspection Lamp.

Editor HORSELESS AGE:

Some of your readers who look after their own carriages particularly, and all automobilists in general, will be interested in the sketch enclosed, showing a cheap light for looking for trouble in the internal economy of all carriages.

The batteries are discarded ones from my gasoline carriage.

The lamp, 4 candle power, cost with



socket 35 cents. The handle is wood, with a hole bored through.

The box (and cover for protection) was made by removing the bottom from a small tin box.

The handle, lamp and wires I carry in the tool chest, and when needed when running at night I attach the wires to my spare set of batteries on carriage.

When in the barn I use the old batteries which are set in a box with the handle. Five of these old cells give me a good light anywhere I want it.

E. A. RUSDEN.

Condenser Queries.

HOLYOKE, Mass., July 30.

Editor HORSELESS AGE:

Can you tell me in your paper what is the advantage of using a condenser with jump spark igniter? Also what effect does it have to connect the condensers in series or in multiple?

What would be the capacity in microfarads of a condenser suitable to be used in a jump spark ignition set, with two secondaries on one primary? K. W.

[The advantages are that a better spark is obtained with the same expenditure of electrical energy and that, as the sparks at the trembler are practically suppressed, the contact points of the trembler will last longer.

There is only one way of connecting the condenser in circuit, as far as we know, and that is across the interrupter or buzzer. The condenser is subjected only to the low voltage of the primary winding, and must therefore be of comparatively large capacity. The capacity most suitable in any particular case depends upon the winding of the coil and upon the circuit breaker, and can only be determined by experiment. For an average coil one-quarter micro-farad is probably all that is required.—ED.]

Skidding.

READING, Pa., July 28.

Editor HORSELESS AGE:

Mr. Krarup's article on automobile accidents contains one statement that, in view of the writer's experience, should not pass unnoticed. He says: "The tendency to skid is aggravated by uneven distribution of the load." From this statement we can only infer that he believes the best results to be obtained by having each wheel carry one-fourth the load, bringing half the weight of the vehicle upon the forward wheels. A very few simple experiments will show him the fallacy of this statement. For example, take a vehicle, load the rear end, select a slippery asphalt street with a pile of sand in the middle of it; drive the vehicle at speed so as to run one forward wheel into the pile of sand and note the result. If the forward wheel is lightly loaded it will pass over the sand and no skidding will result; but if the forward wheel is heavily loaded the sand acts as a very efficient stopping agent and the entire vehicle swings around that particular front wheel, skidding the other wheels. Now let the vehicle be a front driver, and this result will not happen. Further, being a front driver the power of the motor and its inertia are constantly carrying the vehicle ahead, regardless of any tendency in the rear wheels, so, as he truly states, "front drivers are not so liable to skid." The lesson of this simple experiment is that the weight should be carried on the rear wheels, or that the front wheels should be brought to the centre of the vehicle so that striking an obstacle does not throw a resistance on one side of the front end that is not balanced by a similar resistance on the other side.

Regarding non-locking steering devices, this feature may or may not enter. If the pile of sand deflects the steering wheels toward the sand, then, of course, it aggravates the skidding; but many steering gears are in use which, although non-locking, are also practically free from deflection, so the word "reversible" should have been used instead of "non-locking."

A further thought in connection with skidding is that the rear wheels are the driving means, and if they carry the load wholly they have nothing to skid about, so that the tendency of the vehicle is to pro-

ght ahead by its own inertia. But l is carried in front, the propelling ing resisted on one side, may exlf by carrying the pushing end e loaded end. The simple experiushing a box across a floor will it is meant. A man can carry a l without tendency to skid, but if his load on something ahead of attempts to push it he will find able to slide from under him; and els start sliding they are as liable idewise as any way.

er possible cause of skidding may in the use of rear wheel brakes usted, so that one brake applies more firmly than the other. This the same retarding effect on one e vehicle that the sand pile did in f the front wheel, and may cause On this account a brake on the l, which must affect both wheels o be preferred as a preventer of These three points cover the question in a nutshell.

CHAS. E. DURYEA.

ing to the last point discussed, tendency of the vehicle to skid brakes are applied, it is an eximple matter to equalize the acub brakes, while a brake acting he differential is known to favor —ED.]

er Circulation Suggestion.

RSELESS AGE:

of your readers who use water otors with circulating pump may ited in the following simple de-

t an ordinary low pressure gauge lischarge pipe of the pump, placuge dial in front where it can be below the water line of the tank. vious that if the pump is in workthe pressure of a few pounds will he gauge.

pump fails to work the gauge s to zero and it is noted at once. k piston" or burnt cylinder need open through running with the of order if this device is used. uge and pipe should not cost

WM. HOWARD PAINE.

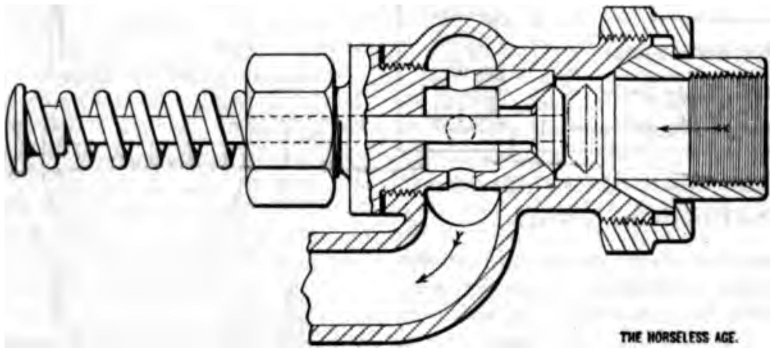
The Toledo Throttle.

BROKEN BOW, Neb., July 29.

RSELESS AGE:

u kindly explain the throttle used oledo people on their steam carHow is it controlled and how can ening be obtained with the short s it practical? W. R. P.

Toledo throttle valve is of the pe, similar to the valves used on engines. It is illustrated hereoiled spring holds the valve down t normally. The lift or opening lve need probably not be more ich, and is obtained by means of a part controlled by the throttle lever, which presses against the button at the end of the valve stem. This mechanism was described and illustrated in our issue of June 25, page 771, last column, which we would advise you to look up. The device is thoroughly practical.—ED.]



SKETCH OF TOLEDO THROTTLE.

Insufficient Safety Appliances.

Editor HORSELESS AGE:

I read with interest your foot note at the end of my letter in your issue of July 16, in which you stated that had my reverse lever been locked in position my engine could not have reversed.

This is certainly a fact, and yet it would have appeared impossible to the writer for his engine to have automatically reversed with the foot lever used on his style of carriage for reversing and which lever is held in its normal position by two powerful springs. The manufacturers of my carriage admitted, however, that this is doubtless what occurred. What do you think of a carriage on which such a thing can happen, with all its possible frightful consequences? Thank the Lord most devoutly that I discovered the treachery of my carriage without endangering the lives of others. And think of it, this carriage is equipped with a single acting brake, which the manufacturers now freely admit will not hold the carriage from going backward down hills. If you are going up a hill and your chain breaks, your brake will not hold you, and if there is not a convenient bank to turn the carriage against, as is the case on many a hill, you will be exceedingly fortunate if you and any friends with you escape without very serious injury.

The first time my machine was wrecked last fall it was caused by the reverse lever sticking in the reverse position instead of returning to its normal position, so that when I put on steam to go ahead my machine shot backward and upset instead of going ahead. Had I been warned by the manufacturers that this was possible I should have been on my guard, just as I would have been had I been warned that the engine might reverse automatically when the carriage was running backward with the link set for forward motion of the engine.

I do not wish to convey the impression that I am afraid to run my carriage, for I would not hesitate to run it without any brake, if I were alone, but with the lives of others in my care it is a different proposition and I know the sensation of feeling that the lives of others with me are in danger through having had my carriage stop and start backward down a steep hill, a serious disaster being only averted through turning my carriage backward against a bank side of the road. Anyone who has had this sensation will agree that an efficient double acting brake is cheap at any price and that an automobile of any kind is not fit to take others out in if it is not provided with a brake that will hold on any hill, either backward or forward. Needless perhaps to state that I made it my first duty to get a double acting brake as soon as I realized the danger to which I had innocently been subjecting others.

What a pity it is that any manufacturer should be willing to sell an automobile that is not equipped with a brake or brakes of sufficient power to make riding perfectly safe, no matter how steep the hills. If the manufacturers have so little regard for human life as to sell machines without sufficiently powerful brakes, I believe that legislation should be enacted to compel them to protect their customers in this respect.

WALTER K. SHAW.

The A. C. G. B. and I. abandoned its trials of electric vehicles because of insufficient entries. The trials may, however, be held during the latter part of this month.

The Otis Elevator Company have been awarded a contract for hydraulic plunger automobile lift to be installed in Miss Helen Gould's stable at No. 213 West Fifty-eighth street, New York city.

At a recent meeting in Paris, attended by representatives of eighteen firms dealing in automobiles, the Chambre Syndicale du Commerce de l'Automobile was formed with the avowed object of protecting the interests of automobile dealers. Officers were elected as follows: M. Petit, president; Messrs. Labour and Loysel, vice presidents; M. Salleron, secretary, and M. Brest Dufour, treasurer.

BEGINNERS PAGE.

Variable Gears With Individual Friction Clutches.

The shifting gear system of variable transmission is almost universally used abroad and has been adopted to some extent in this country. The majority of American built gasoline carriages are equipped either with individual clutch variable transmission or with a sun and planet gear device (also called an epicyclic gear). The first mentioned transmission system (by individual clutches) came into use first and will be described in this article, while the latter, which has come into popularity during the last few years, will be dealt with in a succeeding article.

Individual clutch transmission systems provide for either two forward gear reductions and one reverse, or for three forward reductions and one reverse. A gear with two forward gear reductions and one reverse is illustrated in Fig. 1, being that employed on one of the prominent American machines.

Referring to the figure, A is an extension of the motor shaft, the motor being located at the left of the transmission gear. Solidly fastened upon this shaft is a disk B, and just outside this disk is fitted loosely over the shaft a part comprising another radial disk C, a sprocket pinion D and a gear wheel E. The gear wheel E forms also part of a friction clutch, the other part of which is constituted by a disk F, which slides along the shaft A on a feather key. In this particular kind of friction clutch the friction surface is a plane perpendicular to the centre line of the shaft. The two parts of the clutch are brought in contact by means of the bell cranks G G, pivoted on a bracket H extending from the shaft, and the sliding collar I. Two other spur gears, J and K, are keyed to the shaft A.

Parallel with the shaft A is arranged a countershaft L, which is supported in suitable bearings at its ends. This shaft carries three spur gears, M, N and O, which are continually in mesh with the three gears on shaft A respectively, the first two directly and the last through the intermediary of the gear P. The gear M is keyed to the shaft, while the gears N and O are loose upon it. The latter may, however, be fastened to the shaft by means of friction clutches similar to the one with which the gear E is provided, and a shifting collar R.

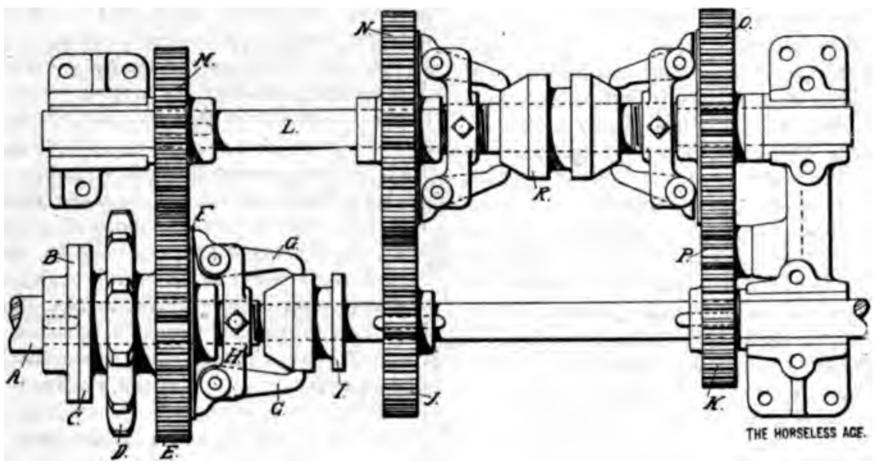


FIG. 1.

The shaft A, of course, is the driving shaft and the power is taken off the sprocket pinion D and is transmitted to a sprocket wheel on the rear axle by means of a chain. The two shifting collars I and R are operated by separate levers.

In the drawing the high speed clutch is shown to be in engagement. The loose part, comprising the disk C, sprocket pinion D and gear E, is clamped between the disks B and F, both of which are keyed to the shaft. The sprocket pinion D therefore turns in unison with the shaft A and the power is transmitted directly from the motor shaft A to the rear axle. When the grooved collar I is shifted to the right the clutch is thrown out, the sprocket pinion D is loose upon the shaft and no power is transmitted. The operating mechanism of this particular transmission system is so arranged that as the motion of the lever is continued after the clutch is thrown out the brake is applied.

If now it is desired to drive the vehicle at a slower speed, the grooved collar R is shifted to the left to make the gear N fast to the shaft. Then the shaft L is rotated from A by means of the gears J and N and the sprocket pinion D from the shaft L by means of the gears M and E. Gear J is smaller than gear N; hence shaft L turns slower than shaft A. And gear M is smaller than gear E; hence sprocket D turns still slower than shaft L. Sprocket pinion D turns, of course, in the same direction as shaft A.

When it is desired to reverse the direction of motion of the vehicle the grooved collar R is shifted to the right, thereby clutching the gear O to the shaft. Now the shaft L is driven from shaft A by means of the gears K, P and O and the introduction of the intermediary gear reverses the direction of rotation of shaft L. The sprocket pinion is again driven from shaft L through the gears L and M and turns, of course, also in the opposite direction as before.

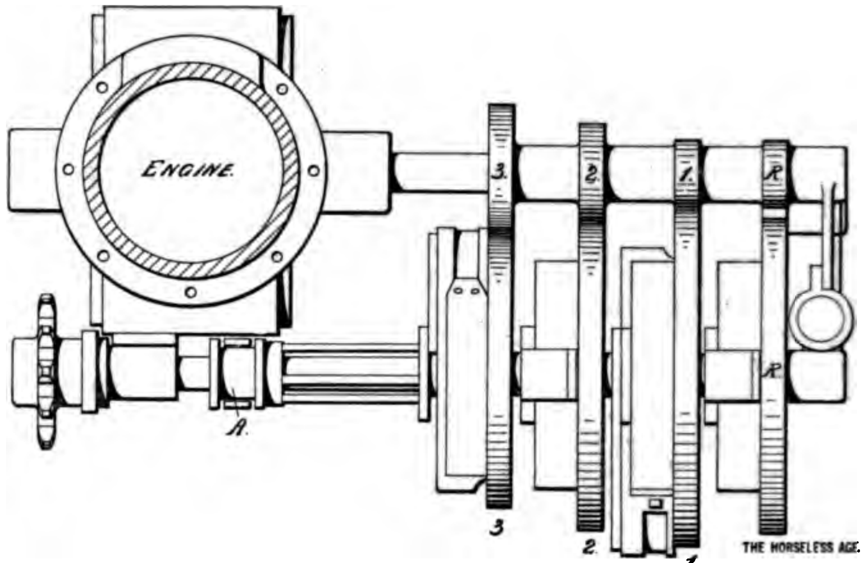


FIG. 2.

In Fig. 2 is shown a gear with three forward and one reverse gear ratios, one that is used on another prominent American machine. It is used with a horizontal engine located in the body of the vehicle at one side, with the crank shaft extending across the body and having its extremity supported by a bearing fixed to the frame tube at the opposite side. This extension of the engine shaft carries four spur pinions, 3, 2, 1 and R, keyed to it. Directly below this shaft, and supported in bearings fixed to the frame tube and the engine crank case respectively, is a countershaft, upon which are mounted four gear wheels, 3, 2, 1 and R, each provided with a friction clutch of the band type, by means of which it may be fixed to the

The gears 3, 2 and 1 are continually ;sh with the pinions 3, 2 and 1, and ear R gears with pinion R through itermediate pinion. It is directly ent that the set of gears 3 3 gives ighest speed, the set 2 2 gives the nediate speed, the set 1 1 the lowest and the set R R the reverse speed. our friction clutches are engaged sucely by a single lever controlling the ed collar A. To this grooved collar astened four cam rods, each cornding to one of the friction clutches, s the collar is shifted along the shaft friction clutch is "thrown in" in From the counter shaft the power ismitted to the rear axle by means of in.

. 3 shows a combination shifting gear ndividual clutch system which gives

G is always in mesh with gear D, and it can be clutched to its shaft B by means of a block friction clutch L operated from the centre of the shaft. Likewise the gear K is continuously in mesh with gear F, and can be clutched to the shaft B by another friction clutch M.

To obtain the lowest speed forward the friction clutch L is engaged, when the power is transmitted from shaft A to shaft B through the gears D and G. Owing to the fact that gear G is about twice as large in diameter as gear D, shaft B turns at only about one-half the speed of shaft A.

To obtain the high forward speed the gear E is shifted to the left, to clutch the gear F to the shaft A; and then the friction clutch M is thrown in. Now the power is transmitted from shaft A to shaft B through the set of gears F and K, and as both of these are of the same diameter

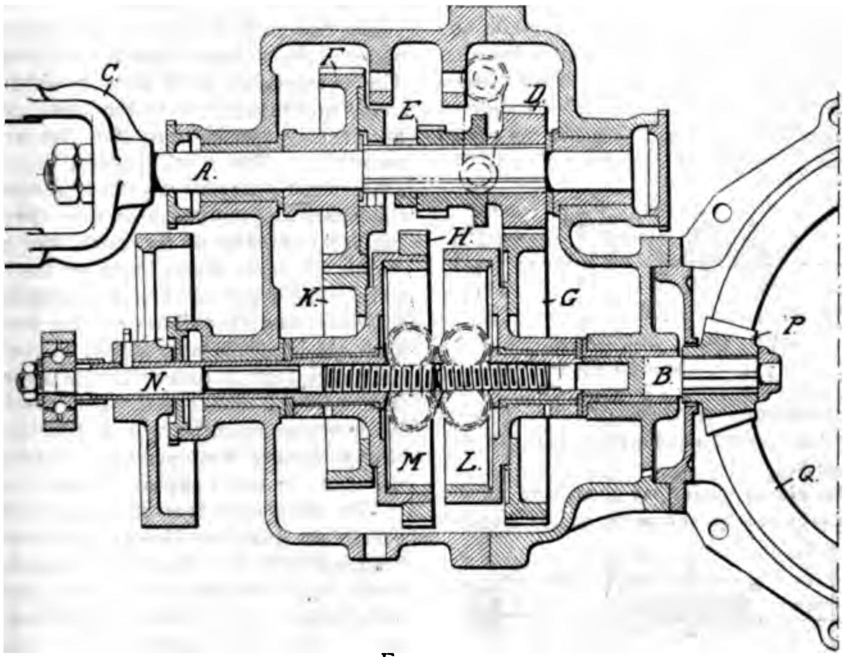


FIG. 3.

eeds forward and one reverse. It is ed for use with chainless or shaft iission, and is somewhat peculiar in s casing is built together with the ntial gear casing, and the shaft with sal joints is interposed between the and the transmission gear and not n the latter and the differential gear, 1 more frequent practice.

s variable transmission gear com- , as usual, two parallel shafts, A and e latter being hollow. Shaft A is by the motor through a universal one part of which, C, is shown in the ig. Upon this shaft A are three spur D, E and F. The gear D is keyed : shaft. Gear E slides on a feather id gear F is normally loose upon the but can be fastened upon the shaft fting gear E toward it, the two gears provided with suitable positive clutch ers for locking or clutching them to- . Upon the hollow shaft B are r mounted the gears G, H and K, the two being in one piece. The gear

the two shafts turn at the same speed. The gear F may remain clutched to the shaft A as long as it is not required to reverse the direction of vehicle motion. To stop and to engage either the high or low gear only the friction clutches need be

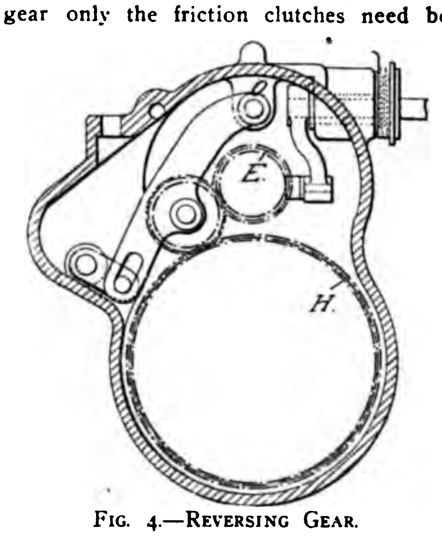


FIG. 4.—REVERSING GEAR.

operated, which is accomplished by moving the clutch rod N in one direction or the other, by means of a single lever.

When it is desired to reverse, however, the gear E must be brought back to the position it is shown to occupy in the drawing. Then an intermediate gear mounted on a support pivoted to the brackets O O is brought in mesh with the two gears E and H, and the clutch M is thrown in again, which causes the vehicle to move backward. The shifting of gear E and the interposition of the reversing gear between it and the gear H is effected by means of a single motion on the part of the operator.

To the end of the shaft B is keyed the bevel pinion P, which is in mesh with the bevel gear crown Q on the rear axle differential gear.

Book Review.

We have received a copy of "Usi di Piazza—Consuetudini Nella Compera-Vendita di Carrozze" (Market Usage—Commercial Practice in the Carriage Trade), by Luigi Belloni, which can be had of Fratelli Bocca, Milan, at the price of 1 lire.

With the object of preventing the too frequent controversies and falsifications in the carriage trade the author of this little brochure has compiled a set of rules for the guidance of carriage manufacturers and dealers in Italy, most of the rules having become established by long usage. As the business methods in the automobile trade in this country are as yet more or less unsettled, it may be of interest to here state a few of the methods of the Italian carriage dealers, although little is to be found in them that can be recommended for adoption.

The usual conditions of payment are that one-half the purchase price is paid down when the order is given, and the other half upon delivery of the carriage. Special vehicles, such as hearses, trucks, &c., must be completely paid for in advance. According to old established custom the purchaser of a carriage pays to the employees of the carriage factory a tip varying between 1 and 2 per cent. of the purchase price and the manufacturer pays to the coachman of the purchaser a "regalia" of 2 to 5 per cent. The manufacturer usually has his trademark engraved upon the axle cap, and a purchaser of a vehicle (an agent) is not allowed to substitute his name or trademark for that of the manufacturer, either on the axle cap or on the axle, these places being reserved for the trademark of the actual manufacturers, who must be registered with the Minister of Commerce.

Both new and second hand vehicles are guaranteed, and forms of guarantees are given for each kind, that for the former stating the term of guarantee to be six months and that for the latter three months. Any defects developing during the term of guarantee are made good by the manufacturer, but the owner must pay cost of shipping to and from the factory.

...OUR... FOREIGN EXCHANGES

The Renault Vehicle.

The Renault Brothers, automobile manufacturers at Aubervilliers, France, have always been comparatively successful in races with their machines. They started some three or four years ago to build a very light machine, a voiturette. A high speed single cylinder De Dion engine was employed and the novel features of the vehicle were the system of thermo-siphon cooling water circulation with a set of radiating tubes on each side of the engine cylinder; the change gearing, which was entirely cut out on the high speed, and the chainless transmission to the rear axle.

FIG. 1.—THE 1902 RENAULT TONNEAU.

These vehicles, as stated, always made a very good showing in their class in races, but in practical work the construction proved too light, and weight has therefore been added from year to year, a policy which has, moreover, been adopted by all French manufacturers of voiturettes that have survived. Added weight calls for added power, and instead of the 3½ horse power De Dion motor used on the original voiturette the latest 8 horse power motor of the same make is used on the 1902 model Renault. Improvements in design independent of weight have also been made in the friction clutch and the transmission gear, and we reproduce here from *La Locomotion* some schematic drawings of the latest designs. It will be noted that these designs are not at all simple, and the contemporary mentioned observes editorially that the success of the Renaults is due to the extreme care which characterizes their shop methods. Designs which might have proved failures if carried out in the average shop were manufactured successfully by them and were kept in the front rank among vehicles of their class.

The Renault change gear system may be regarded as a combination of the shifting gear system and the system with teeth remaining constantly in mesh. It combines

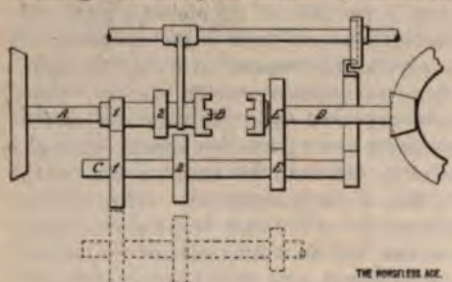


FIG. 2.—FIRST SPEED.

therefore to a certain extent the light weight of the former with the saving of the gear teeth, which is the good feature of the latter.

The gear comprises two parallel shafts. The clutch shaft, which when the clutch is in engagement forms an extension of the motor shaft, is formed in two parts, one terminating in a square section portion on which sliding gears A E, of different diameters, may be shifted back and forth, and the other terminating at its extremity, after the universal joints, in the bevel pinion which is in mesh with the driving gear on the rear axle, and carrying the spur gear D and a member of a positive clutch. The

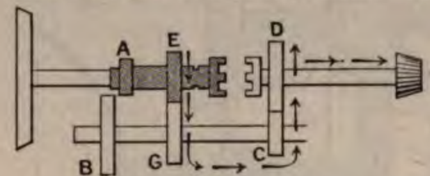


FIG. 3.—SECOND SPEED.

corresponding member of the positive clutch is formed in one part with the sliding gear.

This clutch shaft may thus have its two halves united by throwing in the positive

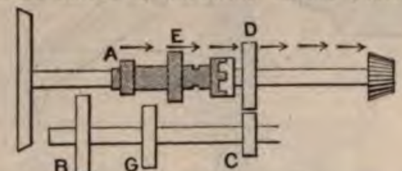


FIG. 4.—THIRD SPEED.

clutch. It may also have its parts rendered independent by disengaging the clutch, and they may then turn at different speeds while still remaining in alignment with each other.

The second shaft of this transmission gear, the intermediary shaft B G C, carries three gears of different diameters, which serve to reduce the speed of rotation and transmit motion from one part of the clutch shaft to the other. The transmission may be effected in the following different ways: By A B C D (first speed); by E G C D (second speed); by direct

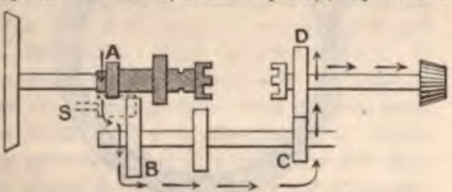


FIG. 5.—REVERSE.

transmission (third speed). In the latter case all gears are out of mesh.

The change from one speed to another is obtained by a very characteristic method. The countershaft B G C is movable. It never moves sidewise to the right or left, but it may recede from the clutch shaft parallelly. The result is—and this is a characteristic feature of this system—that the gears are not meshed from the side, but from the top of the teeth, the entire length of tooth taking hold at the same time. The gears are first displaced longitudinally, and then those on the countershaft are gradually approached to those on the clutch shaft in order that the teeth may take hold of each other. The shock between the tooth surfaces is said to be practically nil and the operation of bringing the gears in mesh extremely easy.

The reader will thus understand that to change the gear two distinct operations are required: (1) To move the countershaft away from the clutch shaft and bring it back again; (2) to shift the sliding gear A E. These two operations are very ingeniously performed by means of a large threaded bolt, which is turned in bearings in the gear case. The bolt has cut upon it a helical groove, through which the fork controlling the shifting gears is operated. A spring which counteracts the operating effort renders the operation very smooth.

The grooved or threaded bolt in changing the gear performs thus three successive functions. In the first place, it moves the countershaft B G C away from the clutch shaft; next it shifts the sliding gear A E, and finally it brings the countershaft back again into operative relation with the clutch shaft. Similarly, to cause a backward motion of the vehicle this same operating mechanism interposes between the gear and pinion of the lowest speed an intermediary pinion S, ordinarily hidden in a corner of the gear casing.

The threaded bolt referred to is operated by means of a toothed sector L keyed to a shaft K, to the extremity of which is fixed the gear changing lever J. This sector meshes with a small gear M, which it turns through a large angle. On the same shaft

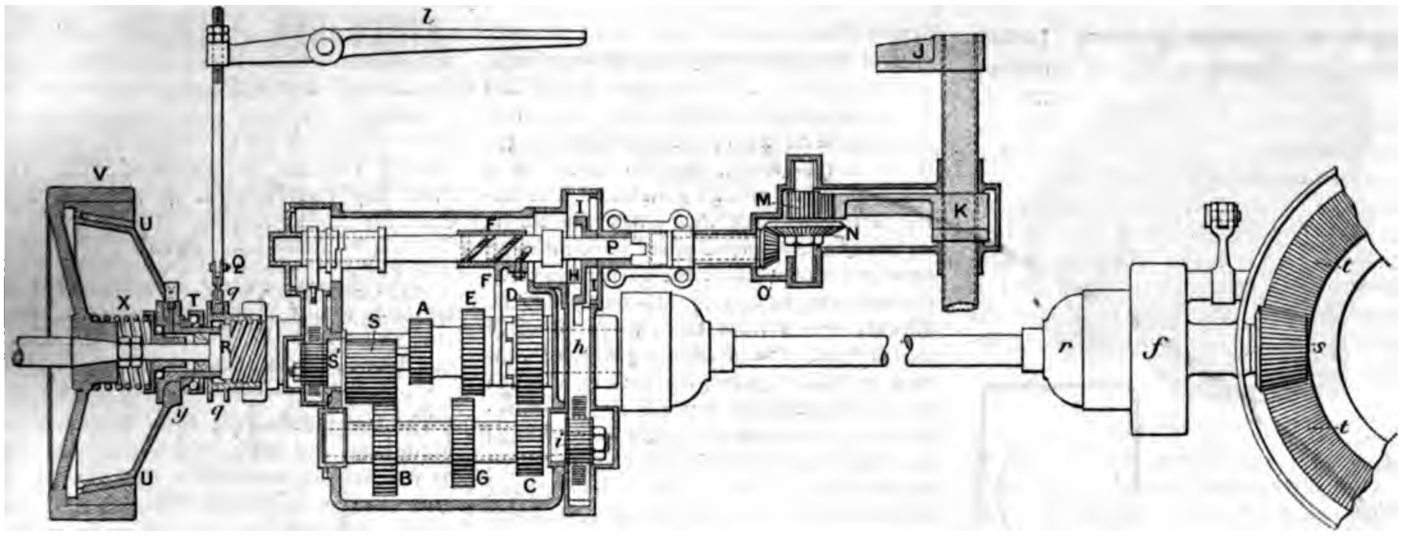


FIG. 6.—THE TRANSMISSION.

as M is keyed a bevel gear N of considerable diameter, which meshes with another smaller bevel gear O, connected by a coupling P to the threaded bolt which accomplishes the shifting of the gears. It results from this double gear multiplication that even a slight displacement of the gear changing lever J produces a rapid rotation of the shaft P around itself. That is to say, while the gear shifting lever is moved from one notch to another it causes a rotation of the bolt P large enough to effect all the three distinct operations necessary for a change of gear, as described above.

No detailed description of the method of operation of the controlling mechanism is given in our contemporary, but we believe it to be as follows:

The countershaft to which the gears B, G and C are fixed is hollow and turns free upon a stud which is provided with eccentrics at its two ends, by which it is supported in the casing. A spur pinion *i*

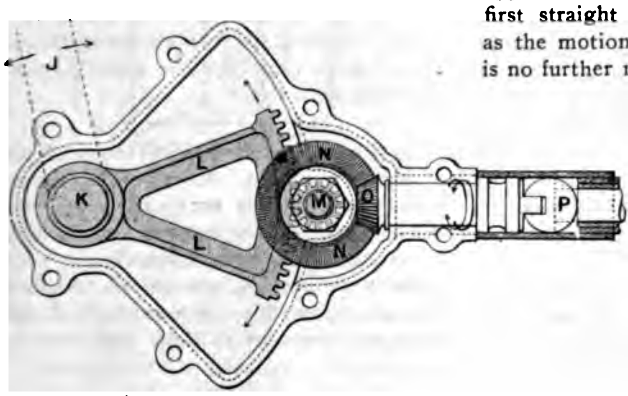


FIG. 7.—"MANDOLINE."

is keyed to this stud at one end, outside the eccentric at that end. In mesh with this spur pinion is a rack *h*. The other end H of this rack is provided with a cam roller which engages with the cam I, fastened to the shaft or bolt P.

It will be noticed that the thread on the bolt P, by means of which the shifting gears are operated, is non-uniform as regards its pitch. At some places the pitch is very steep and at others it is equal to zero—i. e., the thread forms part of a circular groove around the bolt. The bolt at this part is surrounded by the hub of the fork F and a pin extends through the wall of this hub into the groove of the thread. As the bolt is turned this pin must follow the thread and thus the fork, and consequently the sliding gear, is shifted.

There is evidently a slight inaccuracy in the drawing. The shifting gear part is shown in the extreme position to the right and the pin co-operating with the groove on the bolt should evidently be at one end of this groove. The transmission is now direct or the vehicle is on the highest gear. Now let it be desired to change to the intermediate gear. By turning the lever J the bolt P would be turned and as long as the pin remains in the first inclined portion of the groove the fork F and the sliding gears A E would be shifted to the left. When gears E and G come opposite each other the pin arrives in the first straight portion of the groove and as the motion of the bolt continues there is no further motion of the fork and shifting gear—for a time at least. During this time the cam I is active. During the first half of the period that the shifting part is stationary (longitudinally) the cam I through the intermediary of the rack *h* and the pinion *i* approaches the clutch and countershaft and brings the gears E and G in mesh. Now the carriage is on the second gear and the lever J is, of course, in the notch corresponding to this gear. When the lever is moved further the bolt P continues to turn, and during the second half of the period the pin is in the straight part of the groove the two shafts are moved apart again; next the sliding gear is shifted again and the shafts are brought together again, thus bringing the gears A and B in mesh, which gives the first speed.

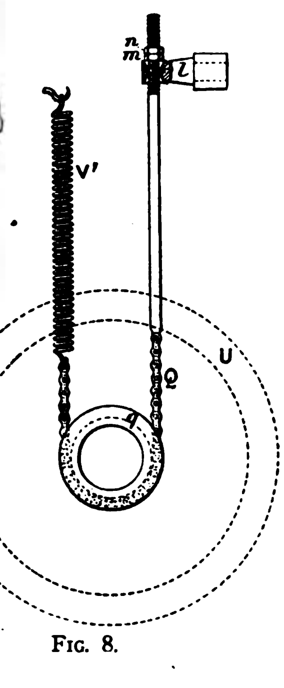


FIG. 8.

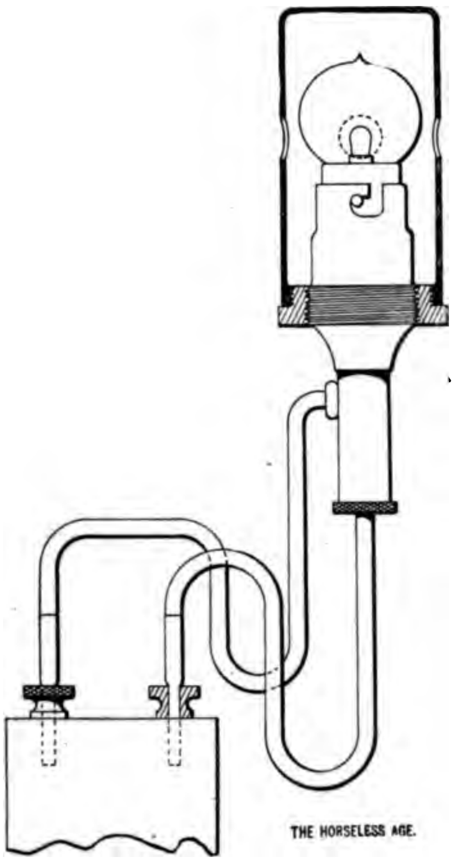
The reversing pinion S, it will be observed, is brought in gear by means of a cam, rack and pinion, the same as the gears on the countershaft.

The operating mechanism is encased and owing to its form the casing is referred to in the shop as the "mandoline."

The friction clutch operates in an opposite direction to the usual construction, the friction cone, instead of being normally forced into the flywheel is forced away from it by a coiled spring X and is "thrown out" by moving it in the direction toward the flywheel. This friction clutch is easily adjusted. It may happen, at the beginning for example, that the clutch develops a tendency to slip. In that case all that is necessary to do is to loosen the nuts *n* and *m* (Fig. 8). This operation has the effect of moving the nut *q* (Fig. 6) further away from the steel sleeve *y* riveted to the clutch cone of aluminum. To secure a good adjustment of the clutch the ball thrust bearing T must have from 1 to 1½ millimetres free play between the nut *q* and the sleeve *y*. It may also happen that the clutch does not disengage properly. That is, that the aluminum cone does not stop rotating when one presses down on the clutch pedal. In that case the play of the bearing T must be diminished, which is accomplished by tightening the nuts *m* and *n*.

Improved Storage Battery Tester.

The drawing shown herewith represents an improved instrument for testing the condition of charge of storage batteries, particularly those used for the ignition of gasoline engines. A miniature electric lamp of an internal resistance corresponding to the voltage of the battery is fastened down to a base. The base is provided with a central projection and is connected by flexible conductors to the terminals of the battery. When the in-



THE HORSELESS AGE.

strument is thus connected to the battery the state of charge can be judged from the brilliancy of the lamp. The lamp is held in the base by a "bayonet" joint. The base is provided with a threaded socket and its circumference is flanged to receive the protecting cover with observation slits. In bright daylight the protecting cover shades off the lamp and thus adds to the facility of making readings. This tester is the invention of Lars Bristol and has recently been patented in England.

Krieger's Combination Vehicle.

The following brief description of the Krièger combined alcohol electric vehicle appeared in the *Electrical Times:*

"During the recent French alcohol trials M. Krièger entered a combined alcohol electric car, which is the first vehicle of its kind to be publicly tested, and is therefore worthy of attention. It is propelled by two Krièger slow speed four pole motors driving the front wheels independently in the manner adopted on the Krièger electric cars. These motors take their current from a battery of forty-four Phœnix cells, with a capacity of 120 ampere hours, and weighing complete 880 pounds. The alcohol engine is a De Dion motor of 4½ brake horse power, coupled direct to a four pole shunt wound generator. The latter is so arranged that when the car is traveling at its normal speed of 10 miles an hour it supplies sufficient current to keep the cells fully charged, thus balancing the amount drawn from the battery to drive the motors. When climbing hills or running at higher speeds, the battery is called upon for additional current and is consequently discharged at a rate proportional to the gradient being climbed or the speed traversed above the normal. The weight of the whole vehicle, including the battery, is 26 hundredweight. The control is effected much in the same manner as the ordinary Krièger electric car, as it is an electric automobile, so far as its road wheels are concerned, and is therefore as easily controlled, and possesses as great flexibility as regards speed, as an electromobile pure and simple."

The president of the Bordeaux Automobile Club announces that the committee of the club have decided not to hold any race this year.

A "Technical Society of the Alcohol Industry" has been formed in France and counts as members most of the exhibitors at the recent alcohol exhibition.

The Albion Motor Car Company, Limited, has been registered with a capital of £25,000 in £1 shares, with registered offices at 169 Finnieston street, Glasgow.

A suit for damages caused by a collision between a Mors and a Reading steam carriage on the anniversary run to Southsea last November came up before an English court recently. The defendant, the driver of the Mors, was charged with careless driving, and it was claimed by him that the exhaust of the steam carriage obscured the atmosphere. The jury allowed the complainant £100 damages.

A few of the participants in the Paris-Vienna race followed the invitation of the authorities of Bosnia-Herzegovina, and continued their journey from Vienna to that country. It appears that, owing to the bad roads in Hungaria, all the vehicles were shipped through that country by railroad. In Bosnia the roads are fine, and as these were about the first automobiles ever seen in that country, they naturally excited much curiosity.

A good story is told of an English magistrate who had to make a hurried journey to a town 24 miles away. As there was no suitable train he went to an automobile agency, and inquired how long it would take to convey him to his destination by automobile. "Two hours and a half," was the answer. The magistrate was surprised. "I thought you could have managed it in an hour or so," he said. "Well, no doubt I could," retorted the motorist, "but the other day you fined me 40 shillings and costs for furious driving."

C. E. Shaw, formerly superintendent of the Olds Motor Works, has gone to England to assist F. W. Peckham at the London branch of the Oldsmobile.

The automobile race from Eisenach to Meiningen and back, which was planned by the German Automobile Union for July 27, had to be abandoned owing to a refusal of the authorities to allow racing on the public highway.

Serpollet is now designing a new racing car for next year's kilometre race at Nice. It will be remembered that he has already won this race twice in succession, and, if he can win it again next year, the cup he now holds will become absolutely his property.

It will be remembered that about two years ago the Shah of Persia bought a Serpollet steam carriage and shipped it to Teheran. During the course of his recent visit to Berlin he exhibited much interest in gasoline vehicles, and at his request a Mercedes of the latest type was taken to the Persian Embassy for his inspection.

Gasoline vehicles usually make better time over a short course, with standing start, than steam vehicles do because the former start with a vim when the main clutch is thrown in. At the Bexhill races in England a Darracq covered the kilometre (standing start) in but one-fifth of a second more time than the world's record breaking Serpollet.

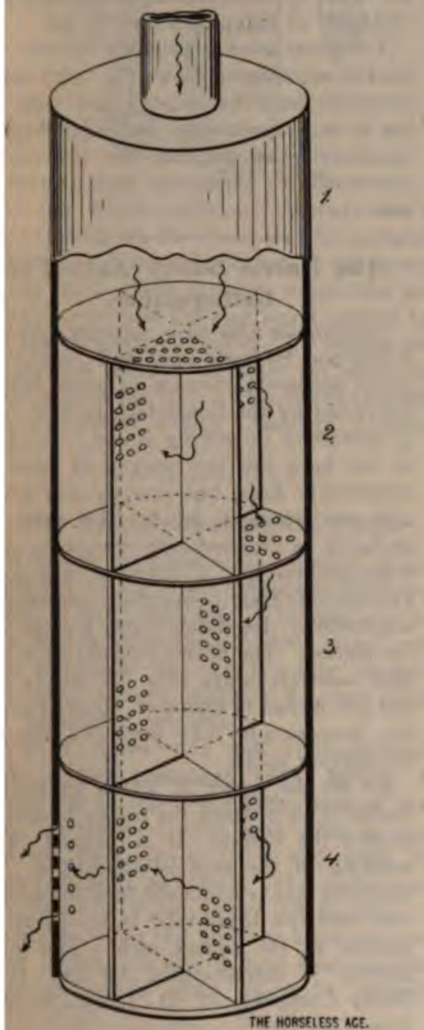
An English policeman has a novel way of timing motorists. He watches them approach a post and notes the time, and when they are about to pass him he stops his time piece. The distance is 220 yards between the post and the officer. A chauffeur was timed this way recently and subsequently fined 10 shillings and costs in court.

In the Paris-Vienna race Baron de Caters' vehicle ran into the car driven by Louis Renault and broke a spring on the latter. The repair job was accomplished in three hours. Soon after Renault's steering gear failed, and the machine landed in the ditch smashing a wheel. He procured some boards of oak, a saw, hatchet and plane, and in three hours was on the road again. He reached Salzburg on time, and made second best time between that city and the Vienna control with the patched wheel.

EW VEHICLES AND PARTS.

The Krastin Muffler.

he Krastin Automobile Company, of veland, Ohio, are equipping their ma-ies with a muffler which they claim to very light and efficient and of peculiar, simple, design. It consists of a sheet cylinder, divided into four compart-its by three sheet iron disks. Three hese compartments are subdivided by



et iron walls into four quarters. The ine exhausts first into compartment . 1 and then by a series of holes, equal area to the exhaust pipe, into a quarter tion of compartment 2; thence the gases s through the other three quarters compartment 2 into compartment 3, ough its four quarters successively into npartment 4; then through its four irters and out to the atmosphere. The nber of small holes decreases gradually the exhaust goes into each successive irter sections into the open air, and discharge is effected through a few es of small area. The result is said to a gradual cooling of the gases as they s through the various sections, so that y reach the outside air at a very low ssure, making no noise. After a series tests it was found that the muffler caused no appreciable back pressure. It is built entirely of sheet iron, and is quite cheap.

The New Bowser Gasoline Storage Outfit.

Fire insurance rules require retainers of gasoline to be kept outside of buildings. Metal tanks are now generally employed by automobilists for storing their supply of gasoline, as these prevent loss by leakage and evaporation and add to the degree of safety. S. F. Bowser & Co., of Fort Wayne, Ind., have lately brought out an improved gasoline storage outfit specially designed for the requirements of automobile owners. The outfit comprises a tank, piping for filling same and for withdrawing the gasoline, and a self measuring pump. The storage tank, buried in the ground outside the building, is filled through a heavy metal filler tube equipped with a lock filler cap of special design and and automatic ball valve air vent which precludes evaporation. The tank of the filler cap extends just above the ground. A graduated measuring rod is furnished with each outfit, and permits to ascertain the gallons of gasoline remaining in the tank by inserting it through the filler tube.

The amount of gasoline in the building with this outfit is limited to a gallon, the contents of the pump cylinder. The pump is built entirely of metal and comprises a double plunger, double brass valve, a dial discharge register and anti-drip nozzle with a lever handle shut off. The pump measures a gallon, half gallon or quart at each stroke, as may be desired. The manufacturers claim the trap in the drip pipe to be a specially valuable feature.

If desired the tanks of automobiles can be filled by connecting a hose to the pump discharge and pumping the gasoline into the tank directly. The outfit is said to comply with all the requirements of the insurance underwriters and to have the indorsement of the governing board of the insurance underwriters for the United States.

The "Solar" Acetylene and Oil Automobile Lamps.

The Badger Brass Company, of Kenosha, Wis., have sent us some particulars of their 1903 automobile lamps. They have brought out a new acetylene headlight, which they call the "Phare Solar," and which they claim to be the most powerful light projector now made for automobiles. The well known "Solar" method of gas generation, consisting in passing water through a wick to the carbide, is retained in this model. The lamp is of "artillery" shape and made of heavy gauge brass. All parts are riveted where needed, and particular attention is given to the finish. The lamp has independent generators, with the Solar patent water feed, and a single key controls the water supply and turns on and

Phare Solar.

off the gas. The generators can be quickly removed for cleaning and refilling without removing the lamp from the irons. All essential parts are made in duplicate and are removable.

One of the novel features of these lamps is said to be that they will automatically generate enough gas for any size burner the owner may desire to use, from ¼ to 1 cubic foot gas per hour. They are guaranteed to burn steadily, and not to jar or blow out under any condition of speed, road or weather, and to show the way from 100 to 1,000 feet ahead of the machine.

The company have also produced and will place on the market next season an oil lamp for automobiles. This lamp is built of spun brass, and all parts are riveted where needed. It is claimed to meet all the requirements of the use it is intend-

Solar Side Oil Lamp. Solar Tail Lamp.

ed for, being proof against jarring and blowing out under any condition of road and weather. These lamps are made in pairs, the left hand lamp being fitted with a sectional green signal glass in front of the lens. The lamps have a double convex lens, ground and highly polished. The height of the lamp is 12 inches without the bail; the depth cf body, 5 inches, and the front is 6 inches in diameter. The lamps are fitted with sockets for standard flat holders, have 1½ inch rear ruby jewels, removable door and extra large oil capacity. The oil fount is easily removed for refilling. The reflectors are made of cold rolled silver on copper, highly polished.

These lamps are made on the cold blast, central draught burning principle, burn kerosene and are fitted with bails, which are recommended as convenient for hand

lantern to inspect machine. The same style lamp will also be supplied without green signal glass, finished in black enamel with nickel trimmings and fitted with concavo convex lens.

For small automobiles the company make what they style the "Solar" baby oil lamps. These are made in pairs to fit either round or flat irons, with bails and finished in full brass. The same style of lamp is made fitted with a socket on the back and red glass front to serve as tail lamp.

The Cummings Cinch Tire Protector.

The Cummings-Kendall Manufacturing Company, of Pasadena, Cal., are manufacturing a tire protector for automobiles illustrated in the cut below. They state that they have arranged to open depots in the principal cities and expect a large sale for the device. The following description was furnished us by the manufacturers:

The objects of the invention are to provide means for increasing the life of rubber tires and to overcome the danger of rim cutting and puncture; also to afford a means of painting tires to harmonize

REAR WHEEL WITH FRONT WHEEL WITHOUT PROTECTOR.

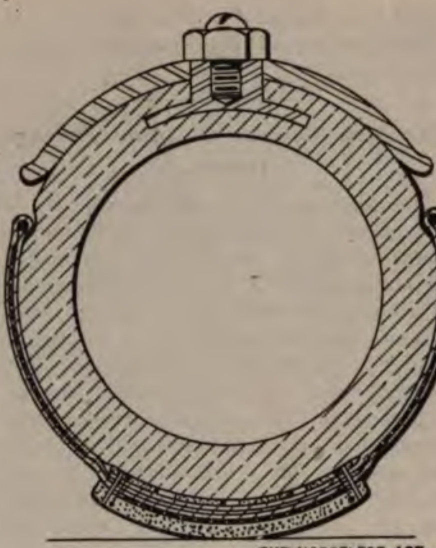
with the running gear and to increase the resiliency and traction.

The cover includes a peripheral crown of heavy sole leather (specially treated to toughen and make it waterproof) which is immovably fastened to the crown of the tire, solid or pneumatic, so that the tire is protected against puncture and wear and against rim chafing.

The protector is easily detachable and affords pockets for thin sheet metal to be inserted at pleasure under the leather tread.

It is found in practice that leather gathers and holds the grit and dust, while rubber clears itself of it. This affords a natural armor for leather and also protects it materially from wear.

The base of the cover to which the sole



SECTION OF TIRE WITH PROTECTOR.

leather tread is anchored is of double thickness of heavy duck, which is made absolutely waterproof and also strengthened by special process. This is clinched on each side of tire by wires set up at the quadrants of the wheel by turnbuckle adjustments, which hold it smoothly and immovably against any lateral or peripheral movement. They also make adjustment and removal easy and practical. The sole leather tread is thus fastened to three thicknesses of canvas and another strip of leather thereunder, by stitching, locked and waxed, which are countersunk and not exposed to wear, and also wooden shoe pegging. Thus the air chamber of a pneumatic tire has a protecting wall about ½ inch thicker than usual, and the added canvas and leather periphery afford additional resiliency. Increased traction is afforded to considerably increase mileage per gallon of fuel, due to the positive grip of the dust covered leather thread. Skidding or side slip is avoided. The "inner leather" referred to is perforated, which permits the soft body of the rubber tire to be forced into the perforations, in the shape of slight projections, which hold the protector against lateral or circumferential movement when the clinches are applied. The protector can be put on and adjusted to any tire in a few moments and can be as quickly removed. It is found that when in place it need not be removed so long as the tire retains its pneumatic condition. After long use the tire has been found in as good condition as when the protector was put on and without evidence of any wear. Thus old pneumatic tires can be made to last indefinitely and new tires can be protected largely against wear.

When the protector is to be applied, the tire is deflated. The protector is made of smaller diameter than the inflated tire. Thus when it is in place upon the deflated tire, the inflation of the tire naturally holds the protector under great strain, which is increased as the turnbuckle adjustments at each quadrant of the wheel are gradually set up.

It is found in practice that the strain applied for holding the protector in place on the tire, is so great that the wires are drawn so forcibly against the tire as to exclude all dust and to support the tire thus preventing rim cutting. Annular lagging of leather can be used within the protector and back of the wires to still further support the tire against this danger and to overcome the tendency to "wobble" of many tires now in use.

The great force obtainable by the turnbuckle adjustment draws the sides of the protector perfectly smooth and taut, giving a neat appearance and affording the opportunity of painting the tires of an automobile to harmonize with its running gear.

The Harris Safety Auto Fire Extinguisher.

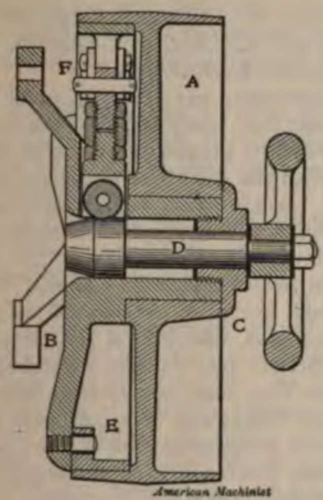
Automobile fires have unfortunately been rather too frequent until now. One specially dangerous feature of such fires, if nourished by the liquid fuel, is that water is ineffective in putting it out. Sand has so far been the best means of subduing automobile fires, but sand is not always and everywhere at hand. The news will probably be received with interest by many automobilists that a chemical fire extinguisher—the Harris—specially designed for automobiles, has lately been placed upon the market. The device consists of a nickeled seamless brass tube 18 inches long and 2½ inches in diameter, which contains the preparation that produces the fire smothering gases.

To set the device in action an exterior handle is turned and the nozzle is directed toward the flames. It is claimed that a bursting of the tube is impossible. The sulphuric acid is contained in a sealed glass tube and the brass tube is tested to 450 pounds to the square inch. The extinguisher is manufactured by the Harris Safety Company, of St. James Building, New York city.

A New Friction Clutch.

We are indebted to the *American Machinist* for the description of the clutch which the cut illustrates.

The cut shows a pulley, with a friction driving clutch, for gas, gasoline or oil engine. The pulley A is a running fit on the hub of a carrier B that is bolted fast to the flywheel of the engine. A cap C at the front of the carrier hub holds the pulley in place. This cap is bored out to form a guide for the spindle or plunger D, which has a cone at the inner end fitting the bore of the hub. The split friction ring or shoe E—which is mounted on the carrier in such a manner that it has a certain amount of freedom—is opened against the friction surface in the pulley rim by means of a toggle F. This toggle has an adjust-



able rod which carries at its lower end a roll resting on the cone on the plunger. When this plunger is pushed in, by means of the hand wheel, the cone moves the adjustable rod, and the ring being opened by the toggle grips the pulley. To release the pulley the plunger is drawn out until the cone strikes the stop. This clutch is made by the Casner Pulley Company, Aurora, Ind.

The Brecht Automobile Parts.

Herewith are illustrated a number of the products of the Brecht Automobile Company, of St. Louis, Mo. The specialty of this firm is automobile running gears and they inform us that they are now increasing their factory facilities to cope with the demand in this line.

Fig. 1 shows their new running gear with a two passenger body, having a hinged lid on top of the body, back of the seat. A copper bonnet, with a lid on top and air openings in front and sides, is placed in front, as shown. The motor can be placed in front under the bonnet or anywhere under the body, as there are no cross springs on the running gear to take away the space which might be wanted for motor, transmission, muffler or anything else.

Fig. 2.

The running gear is built up with a 1¼ inch roller bearing steering axle and a 1½ inch driving axle with roller bearings under the rear springs. The angle iron frame is hung on semi-elliptic springs with wrought iron loops, connected with swinging shackles. The wood wheels have 1¼ inch spokes, steel rims and 3x30 inch pneumatic tires. A double acting brake band is fitted on the compensating gear and fastened to a cross truss. The steering gear is fastened in place, and is constructed so that it will give no back lash. The hand wheel is made of bronze with a mahogany wood rim. This gear is equipped with the company's new combination hanger, swinging shackle and distance rod which keeps the chain in proper tension at all times.

The wheel steering device illustrated in Fig. 2 is said to act quickly and to be positive in action and free from back lash. The hand can be taken from the wheel while running, as holes or obstructions in the road will not change the course of the vehicle. The steering post consists of an outer and inner tube with bronze bushings at either end. This device can be fastened to any running gear. The company also make steering hand wheels of 15 inches diameter and 1 inch or different bore, of bronze, aluminum and iron, with mahogany wood rims.

Fig. 1.

Liverpool Association Meeting.

A meeting of this association was held at Liverpool on Thursday, the 3rd ult., for the purpose of presenting the report for the fifth and sixth sessions 1900-1902. This report described at considerable length, and under many heads, the proceedings and work of the association during the period covered, including last year's competitive trials of motor vehicles for heavy traffic, which comprised the third event of the kind organized by the association. It spoke of the membership roll having increased from 44 in 1896-97 to 138 at the present period. Regarding the resignation of the honorary secretary, E. Shrapnell Smith, the proceedings state that the council have with the greatest regret received the resignation of Mr. E. Shrapnell Smith, who must be considered as the founder of the Liverpool Self Propelled Traffic Association, which was formed early in 1896, and he has been throughout the guiding spirit of the association. The statement of receipts and expenditure, inclusive of £16 17s. of a balance in hand, showed an increase of £207 17s. 4d., and an expenditure which leaves a balance in hand of £15 7s. 6d. The report and statement of accounts were adopted.

A speed meter depending upon electromagnetic action has been devised by M. Hospitalier. The underlying principle is that a voltmeter deflected by interrupted currents will have its needle more or less displaced according to the rapidity of the current impulses. A revolving commutator is connected with some revolving part of the car, and the current from a battery, which may be the battery employed for working the ignition apparatus, is led in series through an induction coil, the revolving commutator and a voltmeter. The deflection of the voltmeter under these circumstances increases with the speed, and may furnish a tolerably accurate indication of the rate at which the commutator is revolving, and therefore of the speed of the vehicle.

The Mont Cenis competition on the 27th, organized by *La Stampa Sportiva*, is being vigorously pushed, prizes being offered to the value of more than 1,000 lire. There will be a speed and a tourist section, the tourist cars setting out at 8 o'clock and the fast cars at 9:30 a. m. Entries close on the 25th.

MINOR MENTION

Dr. O. S. Roberts is erecting an automobile station at Pittsfield, Mass.

D. J. Macdonald, of Anaconda, Mon., has about completed a steam automobile.

M. S. Simmons has opened an automobile station at 167 North Pearl street, Albany, N. Y.

T. G. Hawley, of Paxton, Ill., is building a three seated automobile for C. H. Langford of the same place.

C. W. Maxim, of Middleboro, Mass., is about to engage in the manufacture of automobiles at that place.

The case against the French chauffeur of Oliver Harriman, Jr., White Plains, N. Y., for fast driving has been dropped.

From Fisher Morehouse, of Naples, N. Y., we have received a photo of a light gasoline three wheeler built by himself.

Architect T. H. Scott is taking bids on an automobile house for John S. Scully at the corner of Bellefield avenue and Bayard street, Pittsburg.

The assets of the bankrupt Milwaukee Automobile Company, although appraised at $10,800, were sold for $3,025, after three sales had been held.

On July 26 Harry Kline and A. Long had an automobile collision at Crawfordsville, Ind., in which the rear wheel of one machine was smashed.

The Manhattan Transit Company is said to have ordered a lot of Mobile express wagons, and the first ten are to be delivered within a few days.

Roman Eichstaedt, of Michigan City, Ind., has applied for patents on an automobile engine (gasoline), and intends to manufacture automobiles complete.

O. P. Dorman, of the Salamandrine Boiler Company, contrary to a statement made in a recent issue, is still in Europe, and will remain there till October 1.

Toledo, Ohio, claims to be leading cities of its size in the country as regards popularity of the automobile. The number of vehicles owned there is said to be eighty-eight.

The Newburyport, Lowell and Boston Palace Coach Company, a corporation to operate automobiles between the cities named, has been organized, with a capital of $100,000.

The San Juan (Porto Rico) *News* notices that there is in existence in that city an automobile club, which, although not incorporated, holds nightly sessions on the Plaza Principal.

The Sandusky Automobile Company, Sandusky, Ohio, have turned out their first automobile, a light gasoline runabout, weighing about 600 pounds and equipped with wire wheels.

Charles D. Cooke, of the American Darracq Automobile Company, left New York recently for a two weeks' tour along the Massachusetts coast in a 16 horse power Darracq machine.

The Upton Machine Company have just turned out a gasoline delivery wagon for the department store of Houghton & Dutton in Boston, and are working on four gasoline tonneaus.

Plans are being made for the organization of an automobile club in Wichita, Kan., among the promoters being Sam Sargent, the Shollenberger Brothers and Geo. W. Meredith.

A Chicago report states that James R. McConnell and George W. Garrett arrived there in an automobile from New York on July 30. They were on the road a month, and had to make many repairs.

According to advices from Boston automobile polo is the latest addition to the realm of sport, and Joshua Crane, Jr., of the Dedham Polo Club, has demonstrated that "auto polo" is a possibility.

At Rochester, N. Y., the sub-committee on statistics of the local flood commission of the State commission is planning to take a trip up the river, probably in automobiles, to examine conditions in the Genesee Valley.

The Hudson Avenue Auto Coach line at Newark, Ohio, was stopped July 26. The electric automobiles had been running for nine months, but patronage in that part was not large enough for both the coaches and the street car line.

The Automobile Company of New Concord, Ohio, has been incorporated with a capital stock of $50,000. The incorporators are H. L. Warner, Dayton; J. M. Ikes, Newark; D. S. Burt, Byesville; L. C. Taylor and John S. Black, Cambridge.

Ground was to be broken the present week for an addition of 300x60 feet and three stories high to the works of the Goodyear Tire and Rubber Company, of Akron, Ohio. The new building will provide facilities for 100 additional employees.

The Jackson (Mich.) Automobile Company, capital $24,000, recently filed articles of incorporation with the Secretary of State to engage in the manufacture of automobiles. The stockholders are Chas. A. Lewis, George A. Matthews and B. J. Carter.

The Hahn Automobile Company was incorporated recently at Denver, Col., with $50,000 capital. Charles Hahn is named as president, David Klein as secretary and B. Greenwood treasurer, and the three gentlemen named constitute the board of directors.

A. H. Overman, who is now in England, and is a member of the Clarkson & Capel Steam Car Syndicate, at Chelmsford, has just ordered by cable a set of Bailey's "Won't Slip" tires, the only tires, so he claims, that do not slip on London's wooden pavements.

Among recent New York incorporations is the Automobile Renting Company; capital stock, $2,000; 200 shares of $10 each, Shareholders, Harry S. Turner, Jr., Max R. Orthwein, Ralph H. Orthwein, H. M. Caudrey, George A. Meyer and Henry Koehler, Jr.

A committee has been appointed by the Marion Fire Company, of Ardmore, Pa., to consider a proposition made by John F. Clark, of the Auto Car Company, of Ardmore, relative to the furnishing of an auto combination wagon, which is to be offered to the firemen at cost price.

It is reported that the Colonial Tire and Rubber Company, composed of Akron (Ohio) men, who control the Continental-European rights for the Swinehart solid rubber tire, have established agencies in Berlin, Vienna and Nice, and have just received a proposition from a French manufacturer looking toward the acquisition of the French rights for these tires.

On Monday, August 11, a meeting of the creditors of the Steam Vehicle Company of America will be held at Reading, Pa., for general business, and for the consideration of a petition presented by the trustee, praying for permission to sell the plant and property of the company (excluding, however, five finished carriages which are appraised at the sum of $2,125)) at private sale for a sum not less than $10,000.

An "order to show cause" has been issued in the case of Everit Macy and others against the Automobile Company of America, defendant, whether or not the receiver of the company named should make sale of all the property and assets of the company for the sum of $100,000; and whether in case this sale should not be effected the assets of the company should not be sold by the receiver at public auction. The creditors will be heard at the Chancery Chambers in Newark, N. J., on August 5 at 10 a. m.

Legislative and Legal.

St. Paul, Minn., is to have an automobile speed ordinance.

The park authorities of Denver have passed an ordinance forbidding the operation of automobiles in the park after 6 p. m.

Matthew Kemski, the driver of an automobile belonging to A. A. Hausman, of New York, was fined $10 last week for speeding at Babylon, L. I.

George S. Larrabee, of Syracuse, for whose arrest for automobile speeding a warrant was issued at Casenovia recently, appeared there before Judge Wallace on July 17; he waived examination and gave bail to wait the action of the grand jury.

John S. Sweeney, of 239 West Thirty-eighth street, who operates an automobile between New York and Tarrytown for the benefit of sightseers, was arrested at Ninety-sixth street and Riverside drive, July 26, charged with going at 15 miles an hour. He was released on bail at 10 p. m. the same day.

Although 800 automobile operators' licenses have been issued in Chicago, only seventeen automobiles are mentioned in

sment returns, and notice has been persons on the license list, except nteen, to appear before the board v.

Buffalo Automobile Club has re- the city council to regulate the which automobiles may be op- ı that city.

eported that the American Motor will test the legality of the arrests nobilists at Flushing, L. I., re- ı this issue.

park commissioners of Omaha, cently decided by a vote of 3 to 2 ide automobiles from the parks levards of that city hereafter.

d McDuffee was before Justices k, Hinsdale and Mayer in the Special Sessions, New York, July ged with running an automobile at of 15 miles an hour, and was uilty.

sade against scorching chauffeurs ı instituted at Rochester, N. Y., first arrest was made on July 22. evening of that day two bicycle en equipped with stop watches and eters arrested Herbert F. Fulton eding the legal limit.

Shellbarger, of Saline, Kan., was the District Court there July 25 Gottschall and his wife, Mary A. ll, for $8,136.50 damages for in- ceived in a runaway about a year cause of which, it is claimed, was Shellbarger's automobile frighten- plaintiffs' horse.

irst arrest made in Newport this for fast driving was made recently ie chauffeur of Alfred G. Vander- brought to the police station for on Annandale road on his way to ard Cottage, occupied by his em- At the police station he pleaded nd was fined $10 and costs.

ilwaukee an ordinance regulating d of automobiles, providing that ll not be driven faster than 6 miles on the crowded thoroughfares and an hour in the residence districts, mmended for passage by the judi- ommittee recently. A substitute e prepared by the Milwaukee Au- Club provides for a speed of 15 ı the outskirts, 8 miles in the heart city and 5 miles at corners. A bout numerals and fees is entirely The club will have representa- argue the merits of the substitute he judiciary committee.

Automobile Accidents.

automobile of Joseph Weiss, of em, Pa., was partly destroyed by Ogontz, Pa., on Saturday last.

itomobile driven by Wilbur Cotton troyed by fire on the street at Sac- , Cal., July 26. The lighted match ation was again responsible.

lent Mosler, of the Mosler Safe y, was injured July 25 while going ilton from Cincinnati in his new French automobile. A wheel broke down after striking a boulder in the road, throwing him and his chauffeur to the road. He was painfully cut and bruised, but not dangerously hurt.

The 8 ton gasoline truck which broke through a bridge near Nora Springs, Ia., as mentioned in a recent issue, was built by Hart & Parr, of Charles City, Ia.

At Denison, Tex., an automobile driven by Walter Shepherd was struck by a street car on July 24 at 1:30 a. m. The automobile was wrecked and the driver sustained a broken leg.

While going out to his game preserve near Crawfordsville, Ind., in an automobile, Gen. Lew Wallace lost control of his machine and had an exciting runaway. He was thrown out, but was not seriously injured.

M. Deutsch, donor of the prize of 100,000 francs, which was won by M. Santos-Dumont, was seriously hurt in an automobile accident in a suburb of Paris August 4. Several of his ribs were broken, and he was otherwise injured.

While Mr. and Mrs. Jacob Feudner, of Rushville, Ind., were out riding in their automobile, July 27, the steering apparatus failed to work at the turn of the Shelbyville pike, 5 miles west of town, and the machine ran into a ditch breaking the front axle. The occupants escaped unhurt.

Prof. George M. Holman, of Fitchburg, Mass., on July 28, while coming down a hill in Ashburnham and attempting to turn into another road, lost control of the machine, and it ran into a stone wall and threw both occupants out. Mrs. Holman was not injured, but her husband was rather seriously hurt.

While J. F. Lupton, of Chattanooga, Tenn., was riding in his new automobile he lost control of it. It ran backward down a steep grade at the foot of the mountain, throwing its occupants, Mr. Lupton and Frank Spurlock, out upon the road with great force and bruising them badly, although no bones were broken.

A steam automobile built by Dr. Isaac Moore, of Alton, Ill., was badly damaged by fire July 22 while the machine was temporarily out of repair. The gasoline under the steam generating apparatus blazed up, and it was only by quick work on the part of bystanders that the whole automobile was saved from destruction.

Charles Ives, of Little Falls, N. Y., on July 23, while driving up Douglass street, that city, met with a serious accident. Upon ascending the hill some part of the machinery refused to work and it started to back down the hill. The machine backed into the gutter, turning bottom side up and throwing Mr. Ives out. Mr. Ives was badly cut, but his wife escaped unhurt.

An electric express wagon of the Adams Express Company collided with a street car at Pittsburg, July 28. J. W. Van Meter, who was operating the wagon, and a man who was accompanying him were both slightly injured. The wagon was wrecked and the car was damaged. Both Van Meter and the motorman blame each other for the accident.

Robert A. Lewis, of New York, was caught in Sunday's storm while driving with his automobile at Cold's Neck, N. J. While going down a steep hill the machine became unmanageable on account of the slippery road, dashed into the brook which runs alongside the road and sank nearly out of sight. The injury to occupants and machine was slight.

While being driven at a fast pace in Washington Park, Chicago, July 27, an automobile occupied by J. K. Robinson, son of the president of the Diamond Match syndicate, and his chauffeur swerved from the track and struck a cab driven by Charles Baker and having Mr. and Mrs. Edward F. Keebler as passengers. Mr. Keebler was badly cut and it is feared was injured internally. Mrs. Keebler was cut about the face. The driver, Charles Baker, had his right arm and right leg broken, and his chest was bruised. Robinson's chauffeur, Charles Huck, was arrested, and his employer gave a cash bond for his appearance in court.

R. G. Smith, an employee of the E. R. Thomas Motor Company, of Buffalo, was injured in an automobile accident at Tonawanda July 28. He went to Tonawanda to do a repair job on a carriage on which the steering gear had become disabled, and was riding along Webster street in his runabout, when a horse at the side of the road became frightened at the machine and plunged toward the vehicle. In endeavoring to avoid a collision with the horse, Smith gave his steering gear a quick turn. The automobile was running rapidly and the turn was so short that the driver was thrown nearly 20 feet. He struck the pavement with sufficient force to dislocate his right arm and rupture the muscles of his back.

Trade Publications Received.

Grout Autos. — Grout Brothers, of Orange, Mass.

"The Best Runabout."— Olds Motor Works, Detroit, Mich.

The Holsman Automobile.—The Holsman Automobile Works, Chicago, Ill.

The Stearns Gasoline Cars.—The F. B. Stearns Company, of Cleveland, Ohio.

Harris Safety "Auto" Fire Extinguisher. —Harris Safety Company, St. James Building, New York.

Packard Pointers (for the man that owns one).—The Ohio Automobile Company, of Warren, Ohio.

Blue Flame Kerosene Burner for Steam Carriages, Yachts, Launches, etc.—Novelty Appliance Company, of 100 William street, New York.

Instructions for the Operation of Automatic Circuit Breaker for Charging Automobile Storage Batteries.—Westinghouse Electric and Manufacturing Company, Pittsburg, Pa.

List of Automobile Owners as Filed in the Office of the Secretary of State, at Albany, N. Y.

Allen, Marcus C., Sandy Hill, N. Y.
Alden, Adelbert H. and John V., Lawrence, N. Y.
Aspinwall, John, 290 Broadway, New York city.
Andrus, William L., Yonkers, N. Y.
Adams, Edwin W., 114 Wall street, New York city.
Ayer, James C., 31 West Thirty-sixth street, New York city.
Automobile Touring Company, 57 West Sixty-sixth street, New York city.
Adams, George J., 1458 Fifty-fourth street, Brooklyn, New York.
Argesinger, H., Johnstown, N. Y.
Adams, Maud E., 22 East Forty-first street, New York city.
Allison, J. Wesley, Grand Central Station, New York city.
Arkell, W. J., 110 Fifth avenue, New York city.
Arents, George, Jr., 111 Fifth avenue, New York city.
Adams, Louis R., 1239 Fulton street, Brooklyn, New York.
Ayres, Frederick M., Indianapolis, Ind.
Astor, John Jacob, 23 West Twenty-sixth street, New York city.
Adriance, Benjamin, 461 Greene avenue, Brooklyn, New York.
Adams, Frank W., 9 Jackson street, Watertown, N. Y.
Adler, Simon, 92 St. Paul street, Rochester, N. Y.
Allen, Oscar, Mount Morris, N. Y.
Auerbach, J. S., 32 Nassau street, New York city.
Auerbach, John H., Cedarhurst, N. Y.
Anderson, Larz, Weld, Brookline, Mass.

Borst, Wesley M., Gloversville, N. Y.
Bostwick, Albert C., Mamaroneck, N. Y.
Bronson, Mayhew W., Larchmont, N. Y.
Bier, Sylvan, 43 Cedar street, New York city.
Bieber, Fred. S., Chief Fire Department, Poughkeepsie, N. Y.
Bell, Harriet T., Hudson, N. Y.
Bishop, Sidney, Bridgeport, Conn.
Benton, M. F., 19 Central avenue, New Brighton, N. Y.
Birdsall, Edward T., 170 Woodland avenue, New Rochelle, N. Y.
Barber, Le Droict L., 11 Broadway, New York city.
Bourne, F. G., Oakdale, L. I.
Buffum, Wilder S., Dobbs Ferry, N. Y.
Bugher, F. H., Oakdale, L. I.
Bettys, F. H., 211 West Main street, Rochester, N. Y.
Barnhart, I. C., 218 Arlington avenue, Brooklyn, N. Y.
Brady, E. B., 141-155 East Twenty-fifth street, New York city.
Bergen, A. Beekman, Tarrytown, N. Y.
Brown, David S., Fifty-first street and North River, New York city.
Black, John V., 95 William street, New York city.
Blair, J. Insley, 6 East Sixty-first street, New York city.
Barton, John M., Rome, N. Y.
Billings, R. Bloss, Rome, N. Y.
Beers, E. Le Grand, 129 Pierrepont street, Brooklyn, N. Y.
Brady, James B., 7 West Eighty-sixth street, New York city.
Breese, James L., Southampton, N. Y.
Boune, W. B., 66 Broadway, New York city.
Baldwin, Le Roy W., 8 East Seventieth street, New York city.
Burtiss, A. R., & Son, 148 Jay street, Schenectady, N. Y.
Belmont, August, 23 Nassau street, New York city.
Brokaw, Clifford V., Rye, N. Y.
Barnes, F. M., Middletown, N. Y.
Barlow, George H., Jr., Front street, Binghamton, N. Y.
Bundy, W. L., 135 Murray street, Binghamton, N. Y.
Blake, Henry, 116 West Seventy-eighth street, New York city.
Beach, William M., 26 Cortlandt street, New York city.
Ballard, William M., 58 William street, New York city.
Baumann, Louis, 250 Fifth street, Jersey City, N. J.
Brower, Alex. R., 197 McDonough street, Brooklyn, N. Y.
Bancker, Andrew O., 430 Clinton avenue, Brooklyn, N. Y.
Bowdish, J. L., Oneonta, N. Y.
Betts, G. K., 245 West Water street, Syracuse, N. Y.
Baxter, Mrs. F. R., 926 Exchange street, Rochester, N. Y.
Bailey, Elbert R., Bath-on-Hudson, N. Y.
Bruhn, H., 975 East 133d street, New York city.
Butler, William H., 9 West Twenty-ninth street, New York city.
Brown, George De W., 271 Main avenue, Passaic, N. J.
Browning, J. H., Jr., 199 Chambers street, New York city.
Buzby, Winslow E., 111 Fifth avenue, New York city.
Bolande, Frank W., 49 Cannon street, Bridgeport, Conn.
Babbitt, Searles, 14 West Seventy-fifth street, New York city.
Brunner, G. W., 103 Wilson street, Brooklyn, N. Y.
Backeland, Dr. Leo, Yonkers, N. Y.
Babcock, F. A., Military road, Buffalo, N. Y.
Berg, Ernest J., 1073 Union street, Schenectady, N. Y.
Bamer, George M., Syracuse, N. Y.
Berckmans, G. B., 43 West Seventy-second street, New York city.
Brower, F. C., 317 East Genesee street, Syracuse, N. Y.
Burlew, C. R., 3 Getty Square, Yonkers, N. Y.
Brower, Delos, 110 North Market street, Johnstown, N. Y.
Browning, William H., 408 Broome street, New York city.
Briggs, William H., Rochester, N. Y.
Ball, Henry Dayton, 17 Northern boulevard, Albany, N. Y.
Bailey, Theodorus, Hotel Orleans, New York city.
Baechle, A. J., 221 Genesee street, Utica, N. Y.
Bobrick, Mary E., Hotel Endicott, New York city.
Bouspield, Robt. E., Larchmont-on-Sound, N. Y.
Bontgen, A., Jr., 191 High street, Newark, N. J.
Berdell, Theodore, 17 State street, New York city.
Barker, Hiram L., 16 State street, Rochester, N. Y.
Bapst, Frank L., 1348 Main street, Buffalo, N. Y.
Bradford, William H., Lenox, Mass.
Bingham, C. F., 1080 Delaware avenue, Buffalo, N. Y.
Ballantine, P., 8 Central avenue, Newark, N. J.
Barnes, Edward W., 70 Worth street, New York city.
Bishop, Cortlandt F., 11 Madison avenue, New York city.
Bryan, Gregory S., Bridgeport, Conn.
Bacon, Daniel, care Waldorf-Astoria, New York city.
Bowne, Frederick, 318 Main street, Poughkeepsie, N. Y.
Burch, C. B., Pulaski, N. Y.
Buck, Charles H., Kingsbridge, N. Y.
Butler, E. H., Buffalo, N. Y.
Butler, George P., 9 West Twenty-ninth street, New York city.
Belknap, Eugene W., 319 James street, Syracuse, N. Y.
Browning, Henry K., 408 Broome street, New York city.
Brooks, Harry B., Cohoes, N. Y.
Baruch, Herman B., Hotel Majestic, New York city.
Brown, N. L., 160 West Fifty-ninth street, New York city.
Bishop, David W., Lenox, Mass.
Beach, Edward P., 71 Sherman avenue, Newark, N. J.
Barbour, Robert, 8 Central avenue, Newark, N. J.
Baxendale, T. R. & W. J., Rochester, N. Y.
Bacon, J. G., 33 West Twelfth street, New York city.
Baruch, Bernard M., 351 West Eighty-sixth street, New York city.
Belmont, Oliver H. P., 1 Madison avenue, New York city.
Brandreth, Ralph, 274 Canal street, New York city.
Batcheller, Henry, 44 Fifth avenue, New York city.
Booss, D. E., 45 West Fifty-first street, New York city.

Chamberlin, George F., Harrison, N. Y.
Chamberlin, Edwin C., 4 West Eighty-fourth street, New York city.
Costigan, Gregory, 351 West Thirty-second street, New York city.
Chapin, Henry S., Rockville Centre, N. Y.
Carpenter, J. Herbert, 66 Broad street, New York city.
Conaughty, William L., Waterford, N. Y.
Chase, J. Oscoe, 214 East Fifty-third street, New York city.
Clinton, A. W., Binghamton, N. Y.
Cornell, Edward, Central Valley, N. Y.
Connolly, C. J., 47 Exchange street, Rochester, N. Y.
Case, Milo, Retsof, N. Y.
Collier, H. C., Binghamton, N. Y.
Coykendall, Edward, Kingston, N. Y.
Casler, Herman, Canastota, N. Y.
Cushman, B. A., Yonkers, N. Y.
Corby, A. B., Binghamton, N. Y.
Carpenter, Richard, Port Chester, N. Y.
Chapin, Warren B., 52 West 104th street, New York city.
Carver, Allen F., 1 West Thirty-first street, New York city.
Chubb, Sidney, 37 West Forty-fourth street, New York city.
Crinnian, James M., North Clinton street and Central avenue, Rochester.
Campbell, Samuel, & Brother, Weaver Block, Utica, N. Y.
Chauncey, Clarence M., 17 West Forty-seventh street, New York city.
Cooley, F., 106 West Fifty-first street, New York city.
Crawford, H. L., 35 Nassau street, New York city.
Cowan, C. C., 39 Cortlandt street, New York city.
Craike, C. B., 441 Pearl street, New York city.
Calman, Charles, 299 Pearl street, New York city.
Colgrove, J. F., Arkport, N. Y.
Conklin, Roland R., 135 Broadway, New York city.
Crocker, George, 1 East Sixty-fourth street, New York city.
Crain, William C., Rockville Centre, N. Y.
Cary, S. C., 842 Ocean avenue, Brooklyn, N. Y.
Chapman, Theo. R., 37 Clinton avenue, Jamaica, N. Y.
Conaut, Clarence E., Camden, N. Y.
Comstock, A. W., Ivorytown, Conn.
Campbell, F. I., 8 Central avenue, Newark, N. J.
Clayton, Samuel L., Thirty-third and Chestnut streets, Philadelphia, Pa.
Casper, F. L., Howes Cave, N. Y.
Christie, J. K., 300 West Fifty-eighth street, New York city.
Cuddeback, Wilfred, 812 Sixth avenue, New York city.
Cole, Edward T., 253 Broadway, New York city.
Campbell, J. S., 5 West 119th street, New York city.
Clift, Charles W., 353 Park place, Brooklyn, N. Y.
Colgrove, John P., Salamanca, N. Y.
Clews, Henry W., 15 Broad street, New York city.
Chappell, H. W., 25 Broad street, New York city.
Curtis, Josephine, Montezuma, N. Y.
Clyde, George P., 1 West Fiftieth street, New York city.
Curtiss, Sophia, Sheffield, Mass.
Coatsworth, R. H., 102 Anderson place, Buffalo, N. Y.
Consolidated Gas Company, New York city, N. Y.
Cooley, R. L., 38 Main street, Batavia, N. Y.
Curtiss, Alexander M., 780 West Ferry street, Buffalo, N. Y.
Conklin, W. I., 250 Main street, Hackensack, N. J.
Chittenden, Campbell M., Broad street, Columbus, Ohio.
Case, Willard E., Auburn, N. Y.
Clinton, Arthur, 530 West Water street, Elmira, N. Y.
Crawford, Everett L., 4 West Fifty-seventh street, New York city.
Crowell, William B., 1044 Fifth avenue, New York city.
Christie, Walter, 311 East Seventeenth street, New York city.
Cochrane, A. W. S., 1 West Thirtieth street, New York city.
Chisholm, H. J., 813 Fifth avenue, New York city.
Content, Harry, 62 East Seventy-ninth street, New York city.
Curtis, B. Farquhar, 7 East Forty-first street, New York city.

De Witt, Thomas Dunkin, 111 Broadway, New York city.
Dugro, Charles H., Hotel Savoy, New York city.
Dederick, Archland M., 1 Lodge street, Albany, N. Y.
Doyle, Gregory, Syracuse, N. Y.
Denniston, Robert, Dobbs Ferry, N. Y.
Davis, Abel, 111 Moullon street, Watertown, N. Y.
Doilen, Von, W. D., 42 Fourth avenue, New York city.
De Forest, Louis H., 14 East Fiftieth street, New York city.
Daniels, Frank H., 103 West 122d street, New York city.
Dake, W. W., Rochester, N. Y.
Desberon Motor Car Company, New Rochelle, N. Y.
Du Jardin, Rowland, 129 East Seventy-sixth street, New York city.
Dobbins, Edwin A., 320 Broadway, New York city.
Durand, J. M., Jr., care Plaza Hotel, New York city.
Demerest, G. C., Stapleton, S. I.
Demerest, William C., 68 East Sixty-sixth street, New York city.
Davis, Samuel T., Jr., 7 East Forty-second street, New York city.
Dorion, Severe, 208 Green street, Syracuse, N. Y.
Densmore, D. J., 463 Bedford street, Brooklyn, N. Y.
Dow, Charles H., 42-44 Broad street, New York city.
Daye, William, Amserdam, N. Y.
Dickson, William, 1189 Dean street, Brooklyn, N. Y.
Dinsmore, Clarence G., Staatsburgh-on-Hudson, N. Y.
Donaldson, W. E., 293 Highland avenue, Buffalo, N. Y.
Dawson, J. H., 8 Central avenue, Newark, N. J.
Duncan, Walter N., Loudonville, N. Y.
Dayan, Stephen S., Syracuse, N. Y.
Davies, Julien T., Jr., 32 Nassau street, New York city.
Dark, Samuel J., 93 Windsor avenue, Buffalo, N. Y.
Davey, W. H., 231 First street, Niagara Falls, N. Y.
De Graff, Howard A., Fonda, N. Y.
Dixon, William P., 29 West Forty-ninth street, New York city.
Dascher, Chas., 142 Ross street, Brooklyn, N. Y.
Daggett, Jos. M., 115 Broadway, New York city.
Derrick, George W., 282 Summer street, Buffalo, N. Y.
Dowdney, Daniel J., 252 East Sixty-first street, New York city.
Dickert, John G., 928 Bushwick avenue, Brooklyn, New York.
Day, R. F., West and Porter avenues, Buffalo, N. Y.
Daniels, J. D., Albion, N. Y.
Dederick, Bertha F., Albany, N. Y.
Davis, A. B., 1914 Cherry street, Philadelphia, Pa.
De Dion-Bouton Motorette Company, Thirty-seventh street and Church lane, Brooklyn.
Dalley, H. A., 9 East Sixty-ninth street, New York city.
Dewing, H. E., Yale Club, 30 West Forty-fourth street, New York city.
Davis, J. Edward, 9 Broad street, New York city.
Danley, F. R., Attica, N. Y.

Lawrence B., 532 Fifth avenue, New city.
lfred G., 115 Fifth avenue, New York city.
H. W., Binghamton, N. Y.
L. B., Chenango Forks, N. Y.
William S., 87 Nassau street, New York

Ellicott, White Building, Buffalo, N. Y.
Joseph O., 84 Wickham avenue, Middle-, N. Y.
iarles L., 2-4 Wall street, New York city.
ok, Richard, 778 West End avenue, New city.
ieorge, South Orange, N. J.
n, John, Easton, Pa.
, George, Kodack Company, Rochester,

larence, major, U. S. A., Rye, N. Y.
llis F., Woodbridge, N. J.
I. W., Passaic, N. J.
Frederick H., 107 Kirk avenue, Syracuse,

F. L., foot Thirty-ninth street, Brooklyn,

Dr. W. G., 184 Willis avenue, New York

. W., 2 West Eighty-eighth street, New city.
. Dixon, 136 West Seventy-second street, York city.
, W. J., Bayonne, N. J.
ouis G., 143 Ross street, Brooklyn, N. Y.
. W., 55 Monroe avenue, Rochester, N. Y.

I. P., Carthage, N. Y.
Charles, Stuyvesant Falls, N. Y.
eorge F., Sage College, Ithaca, N. Y.
urgh, A. C., 403 Prospect avenue, Syra- N. Y.
Dr. F. L., 31 La Fayette street, Bingham- N. Y.
. S., Scarsdale, N. Y.
Edwin, 16 Orchard street, Middletown,

F. G., Binghamton, N. Y.
ank Ray, 207 Hawthorne avenue, Yonkers,

William, Fillmore, N. Y.
k, W. J., 1024 O. C. S. B. Building, Syra- N. Y.
:, Thos. W., 20 Portsmouth Terrace, ester, N. Y.
H. N., 339 West Seventy-seventh street, York city.
siah M., 20 Broad street, New York city.
, W. H., Walden, N. Y.
on, James, Hyde Park, N. Y.
acob, 161 North Water street, Rochester,

Charles C., 90 Ridge street, Glens Falls,

P. F., New York city.
an, Max, 302 Broadway, New York city.
. Rodney, Brooklyn, N. Y.
lbert O., care Alliance Bank, Rochester,

alter E., Hempstead, N. Y.
E. G., Scarsborough, N. Y.
red., 195 Hopkinson avenue, Brooklyn,

. J., Thirty-seventh street and Church Brooklyn, New York.
John L., St. Louis, Mo.
n, G. F., 28 Marcy avenue, Brooklyn, New

Macomb G., 876 St. Nicholas avenue, New city.
Gordon, Knickerbocker Club, New York

W. P., 302 West Eighty-sixth street, New city.
Will C., Watertown, N. Y.
aldt, George B., 50 Broadway, New York

Chas. H., Pawling and Maple avenues, N. Y.
rank J., Tarrytown, N. Y.
dwin, 195 Broadway, New York city.
ugh, H. J., 18 Seventh avenue, Brooklyn,

F. J., Utica, N. Y.
in A., 42 Main street, Binghamton, N. Y.
L. D., 357 Seventh street, Buffalo, N. Y.
r, Max, 5-7 South William street, New city.
W. S., 3d, 29 Broadway, New York city.
Electric Company, Schenectady, N. Y.
Chas. D. P., 90 Nassau street, New York

. M., 50 Broadway, New York city.
Robert, 483 Fifth avenue, New York city.
William S., 25 West Thirty-third street, York city.
Chas. J., Waldorf-Astoria, New York

Olin J., Palmyra, N. Y.
Chas. C., 340 State street, Bridgeport,

eorge J., Lakewood, N. J.
Edward L., Hamburg, N. Y.
ames & Co., Albany, N. Y.
Ellsworth, Waverly, N. Y.
. P., West Colesville, New York.
Charles M., 25 West Thirty-third street, York city.
Albert C., 844 East 165th street, New York

. T. F., Mount Vernon, N. Y.
I. A., 195 Broadway, New York city.

Glen Springs Sanitarium Company, Watkins, N. Y.
Goodridge, T. W., 32 West Seventeenth street, New York city.
Gerard, E. D., 122 Milton street, Brooklyn, N. Y.
Gould, Howard, Port Washington, N. Y.
Gallatin, Goelet, 37 Wall street, New York city.

Herrick, Clinton B., Troy, N. Y.
Hooper, George H. and Frank C., Ticonderoga, N. Y.
Hatch, Frederick H., 30 Broad street, New York city.
Harned, Bedell H., 3 West Eighty-seventh street, New York city.
Hubbard, George J., Port Jervis, N. Y.
Haskins, Chas. H., 70 Linwood avenue, Buffalo.
Hayes, Horace P., 312 Elk street, Buffalo.
Hays, William H., 23 Maiden lane, New York city.
Howe, Samuel P., 220 Eddy street, Ithaca, N. Y.
Hutchinson, Dr. H. S., 15 Grand Boulevard, Binghamton.
Hastings, Theo. K., 118 Nassau street, New York city.
Hasbrouck, David M., Dobbs Ferry, N. Y.
Hammond, Allen S., Kingston, N. Y.
Huppach, Winfield A., Sandy Hill, N. Y.
Hanlein, Henry, 417 East 103d street, New York city.
Heller, Lew, Binghamton, N. Y.
High, John M., 29 Broadway, New York city.
Hurlbut, W. D., Ithaca, N. Y.
Hanson, H., 11 Buckingham street, Rochester, N. Y.
Hooper, H. W., 271 Mulberry street, New York city.
Homan, Frank D., 687 Amsterdam avenue, New York city.
Homan & Schulz, 2642 Broadway, New York city.
Henry, McA., Hornellsville, N. Y.
Higham, Charles, Middletown, N. Y.
Hall, William H., Jr., 265 West Seventy-third street, New York city.
Hidley, J. H., 408 River street, Troy, N. Y.
Hewitt, Edward R., Garden City, L. I.
Hawley, J. M., 49 West Seventy-first street, New York city.
Horton, E. P., 105 Railroad avenue, White Plains, N. Y.
Halliwell, Geo W., 290 Main street, Poughkeepsie, N. Y.
Hearn, John, Hudson, N. Y.
Hayes, William Henry, 23 East Sixty-fourth street, New York city.
Hamlin, William, 1058 Delaware avenue, Buffalo.
Hall, G. W., & Co., Cattaraugus, N. Y.
Hinkel, F. W., M. D., 412 Franklin street, Buffalo.
Hayward, Elmer L., 103 Gates avenue, Brooklyn, N. Y.
Hubbard, George A., 16 Sheridan avenue, Albany.
Hamlin, H. E., 521 West 161st street, New York city.
Herschfield, A., 141 Broadway, New York city.
Hallenberg, A. W., 107 East Sixtieth street, New York city.
Hudson, Walter G., 73 West 131st street, New York city.
Hicks, Elias P., 950 Flatbush avenue, Brooklyn, New York.
Healy, Raymond, 26 South Oxford street, Brooklyn, N. Y.
Hall, William A., 1008 Fifth avenue, New York city.
Hodgson, J. H. P., 29 Washington square, New York city.
Herrmann, Milton C., 31 Thomas street, New York city.
Handley, R. H., Hauppauge, L. I.
Hill, W. W., 31 Washington place, New York city.
Hine, O. N., Tully, N. Y.
Heinsheimer, Louis, 17 West Seventieth street, New York city.
Huppel, J. Chr. G., 229 East Thirty-eighth street, New York city.
Hawley, Hiram B., Syracuse, N. Y.
Hills, Henry M., Bridgeport, Conn.
Herman, D. W., 568 Broadway, New York city.
Hill, C. L., 34 North Pearl street, Albany.
Haslehurst, E. W., Ossining, N. Y.
Hamilton, C. M., Ripley, N. J.
Haselton, Barton, Rome, N. Y.
Hunt, C. W., Stapleton, N. Y.
Hakes, Chauncey D., 84 South Pearl street, Albany.
Hulbert, E. M., Cortland, N. Y.
Heisinger, W. F., 1009 Broadway, Brooklyn.
Hendrix, Clifford R., 882 Carroll street, Brooklyn.
Hutton, F. R., 319 West 107th street, New York city.
Havemeyer, Hector H., 10 East Fifty-seventh street, New York city.
Hatch, G. T., Waterville, N. Y.
Holley, James A., Walton, N. Y.
Hening, C. H., 8 Central avenue, Newark, N. J.
Herrick, Geo. M., 278 Remsen street, Cohoes.
Haines, John P., northwest corner Madison avenue and Twenty-sixth street, New York city.
Hower, L., Rome, N. Y.
Hubbell, W. H., 33 Pine street, New York city.
Harris, W. F., 8 Central avenue, Newark, N. J.
Hellman, J. A., 106 West Seventy-third street, New York city.
Hemstreet, J. V., Herkimer, N. Y.
Hollins, F. C., 11 Wall street, New York city.
Hall, W. A., 74 John street, New York city.
Hatch, Walter C., 176 West Eighty-first street, New York city.
Hallenbeck, Orlando J., Canandaigua, N. Y.
Haynes, J. W., South Manchester, Conn.

Honigman, Isaiah, 213 West Seventy-eighth street, New York city.

Ingraham, G. H., Amsterdam, N. Y.
Ide, J. W., Troy, N. Y.
Iselin, W. E., New Rochelle, N. Y.

Jessup, George P., New Dorp, N. Y.
Journal Company, The, Albany, N. Y.
Jones, W. W., 128 West Fayette street, Syracuse, N. Y.
Johnson, Charles H., Westfield, N. J.
Janer, John M., Poughkeepsie, N. Y.
Jackson, John C., Fort Plain, N. Y.
Jones, Robert H., 1040 Ocean avenue, Brooklyn.
Johnson, H. D., 20 Fifth avenue, New York city.
James, Walter B., 17 West Fifty-fourth street, New York city.
Jaeger, Frank W., 132 Mulberry street, New York city.
Jerome, William T., 525 West 148th street, New York city.
Jamieson, M. W., Warren, Pa.
Johnson, Moses, Salem, N. Y.
Jones, G. Whitfield, 240 Genesee street, Utica.
Jaeger, George A., 132 Mulberry street, New York city.
Jempson, Charles, 1030 West avenue, New York city.
Johnson, Bust C., 1404 Main street, Buffalo.

Kautz, J., Albany, N. Y.
Kinney, C. L., Cortland, N. Y.
Kent, A. L., Binghamton, N. Y.
Kinde, F. W., Canandaigua, N. Y.
Kierstead, E. B., 283 Bergen avenue, Jersey City, N. J.
Kimball, E. T., 57 West Sixty-sixth street, New York city.
Kilmer, D. U., Binghamton, N. Y.
King, Hal, Rome, N. Y.
Kent, Percy, 33 Pearl street, New York city.
Keegan, William A., 170 South avenue, Rochester.
Kernochan, Marshall R., 182 Madison avenue, New York city.
Kinney, Francis S., 135 Broadway, New York city.
Keese, J. Mumford, 211 Shennard street, Syracuse, N. Y.
Kiene, Linus, 581 William street, Buffalo.
Kallenbach, H. J., 65 South Eleventh street, Brooklyn.
Kilmer, Willis S., Binghamton, N. Y.
Kachelmacher, N. C. L., 396 Greenwich street, New York city.
Kinsley, James, 20 King street, Troy, N. Y.
King, George R., New Brighton, N. Y.
Kramrath, A., 49 South Pearl street, Albany.
Kountze, A. F., 650 Madison avenue, New York city.
Keene, Foxhall, 30 Broad street, New York city.
Kempner, Irving I., 149 Broadway, New York city.

Luttgen, Walther, 23 Nassau street, New York
Lovejoy, J. R., Schenectady, N. Y.
Loeffler, August, Tompkinsville, N. Y.
Lane, C. A., Phelps, N. Y.
Lightfoot, Robert, 537 Summit avenue, Jersey City, N. J.
Leahy, Ed. W., 9 La Fayette street, Albany.
Laurer, J. F. D., 17 Nassau street, New York city.
Lauder, George, Jr., 36 West Eleventh street, New York city.
Leoser, Thomas S., 34 Beaver street, New York city.
Lane, William J., Poughkeepsie, N. Y.
Lane, George, Poughkeepsie, N. Y.
Lee, J. C., Watertown, N. Y.
Lohman, Mrs. J., 185 Sixth avenue, New York city.
Lyman, John G., 9 East Sixty-third street, New York city.
Lyon, Whitney, 141 Charles street, New York city.
Leonard, H. Ward, Lawrence Park, Bronxville, N. Y.
Levy, H. A., 52 Broadway, New York city.
Liptrott, W. E., 29 West Forty-second street, New York city.
Livingston, C. V., Rondout, N. Y.
Lamont, George F., 1 Third place, Brooklyn.
Losee, Edwin K., Upper Red Hook, N. Y.
Lemley, Walter H., 19 Riverside avenue, Rensselear, N. Y.
Lewis, Fred. W., 1 Maiden lane, New York city.
Lyth, William H., 169 Northland avenue, Buffalo.
Le Prease, Charles, Syracuse, N. Y.
La Roche, F. A., 654 Hudson street, New York city.
Larson, J. Albert, 204 West Twenty-third street, New York city.
Lee, Charles A., Oneida, N. Y.
Lange, Adolph, 274 Flatbush avenue, Brooklyn.
Lewkowitz, Benno, 40 East Sixty-seventh street, New York city.
Lewis, F. E., 2d, Tarrytown, N. Y.
Leighton, William T., 20-22 Trust Building, Rochester.
Lorillard, E. E., New Rochelle, N. Y.
Liptrott, Richard U., 180 Broadway, Brooklyn.
Liptrott, Robert, 180 Broadway, Brooklyn.
Levis, H. C., care General Electric Company, Schenectady.
Laidlaw, C. E., 49 West Eighty-fifth street, New York city.
Law, James, M. D., 19 East 127th street, New York city.

(To be continued.)

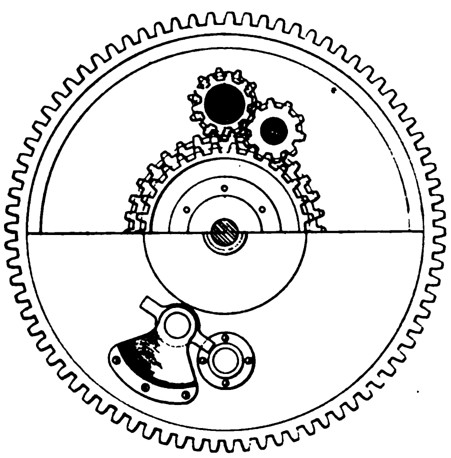
MOTOR VEHICLE PATENTS..

United States Patents.

705,567. Wheel.—E. J. Edwards, of Aspen, Col. July 29, 1902. Filed May 11, 1901.

705,588. Compensating Gearing.—Edward Huber, of Marion, Ohio. July 29, 1902. Filed January 13, 1902.

A compensating gear of the spur type.



No. 705,588.

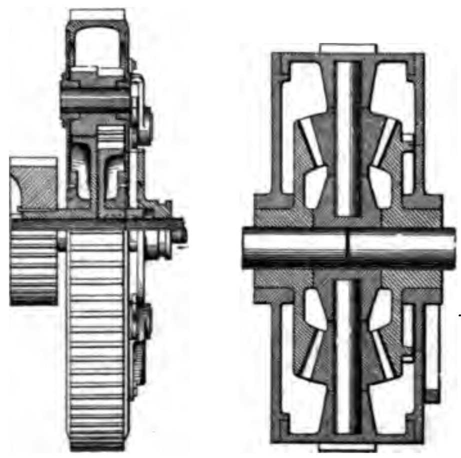
The main driving gear is fastened to a casing in which the studs for the compensating pinions have their bearings. The two master gears are of unequal diameter and each set of pinions comprises three instead of two, as usual. In mesh with the largest of the two master gears is a comparatively large pinion, which latter is formed with a pinion of smaller diameter, as an extension thereof. Between the small pinion and the small master gear a small intermediate pinion is interposed. The construction seems to be slightly more compact than the ordinary form of spur compensating gear, but it has the disadvantage that the turning effort on the two wheels is not alike and skidding might result if the device was used on an automobile. It appears that it is designed more particularly for traction engines.

705,616. Galvanic Battery.—C. B. Schoenemehl, of Waterbury, Conn. July 29, 1902. Filed December 1, 1900. The invention relates to galvanic batteries for spark producing purposes, wherein suitable materials—such as oxide of copper, zinc, and caustic solutions—constitute the operative ingredients. The object is to produce an improved form of electric battery of the above type which is especially designed for use in automobiles.

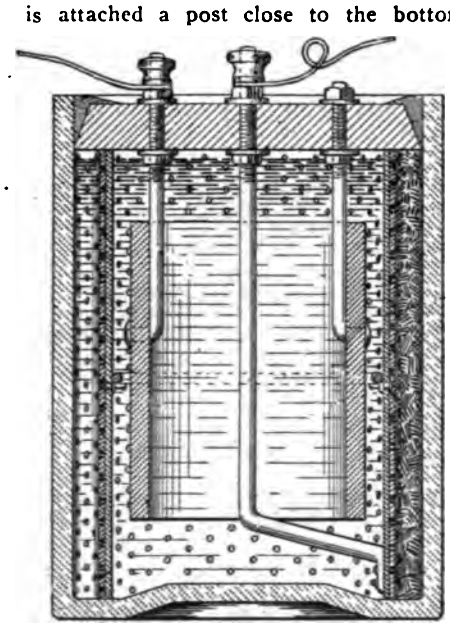
The battery comprises a battery jar of the usual cylindrical construction, containing the solution. Oxide of copper is retained within pockets formed adjacent to the interior wall of the jar by means of corrugated sheet tin tube arranged against the jar.

Against this corrugated sheet metal tube is placed a detachable perforated sheet tin wall, enclosing the inner side of the inner pockets formed by the corrugated tube before mentioned. In practice both this corrugated tube and the plain inner perforated sheet metal tube are formed in straight sections or strips rolled up into a tube with their uniting ends loosely overlapping, making them adjustable within the jar and also readily removable when recharging or other occasion may require.

The interior sheet metal wall is provided with studs to form rests upon which to



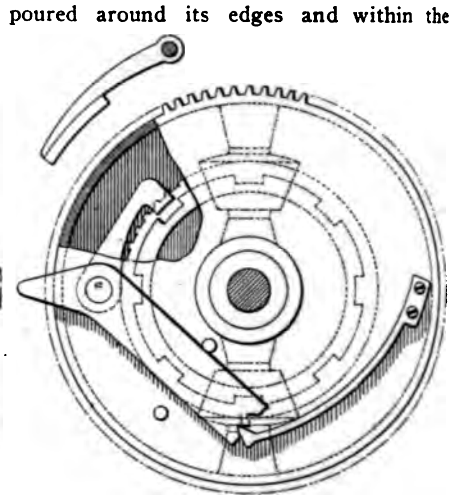
support an expansible wire. This wire is made of spring metal and in practice is bent to horseshoe shape, and from this shape compressed by hand sufficiently to be placed interior of the walls in question in a manner to force them out tightly against the jar, thus producing a perfectly rigid oxide of copper receptacle interior of the zinc, which operates in conjunction therewith. These parts, together with their enclosed ingredients (oxide of copper), comprise the negative element of the battery, and against the interior wall thereof is attached a post close to the bottom,



No. 705,616.

which post is deflected inward and brought up central of the basket, with its upper end threaded to receive binding nuts for the wire connection.

The jar is provided with a cover of insulating material, which is made with its upper edge beveled off and its lower edge formed of a diameter to snugly engage the interior of the jar. This cover rests upon the upper edge of the perforated sheet metal strips, and by reason of its engagement with the sides of the jar is necessarily held rigid. After the cover is placed in position melted wax or similar material is poured around its edges and within the



No. 705,671.

recess formed by the beveled off portion, so as to seal the jar and more rigidly bind the cover in position, thus preventing the escape of the fluid.

The zinc element for the battery is located interior of the oxide of copper and is of cylindrical form and supported from the cover by means of wires, which are secured to the cover, similar to the central wire.

705,671. Differential Gear for Self Propelling Vehicles.—Arthur Herschmann, of New York, N. Y., July 29, 1902. Filed June 21, 1901.

The invention provides means for locking the differential gear. One of the master gears of the differential is provided with a flange in which is formed a series of notches. At a convenient point in the casing of the differential, or the drum, is located a shaft, having its bearings in the sides of the drum, near the periphery, and one end of the shaft extends outside of the drum, where it is provided with a lever, rigidly secured thereto and having two notches in its outer end. This lever is in a plane parallel to the side of the drum and close to it and is adapted to rest against either of two stop pins on the drum and to be held in those positions by a spring, the end of which engages one or the other of the notches. Inside of the drum the shaft carries a pawl or dog, which is located in the plane of the flange on one of the master gears. This pawl is adapted to be thrown toward and away from the flange by rocking the shaft, which motion will cause it to engage or disengage with one of the notches in the

flange of the gear wheel. For obtaining this movement of the dog the lever outside the drum is provided with an extension projecting beyond the periphery of the drum a slight distance, and on a suitable part of the frame of the vehicle is pivoted a lever carrying a stop block, adapted to be thrown into and out of the path of the extension by means of a system of levers operated by the driver of the vehicle by means of a pedal.

The operation of the device is as follows: When the driver finds that the vehicle is stalled, due to slipping of one wheel, he depresses the operating pedal, after having slowed down the engine. This brings the stop block in the path of motion of the extension on the lever outside the drum, operates this lever and causes the pawl inside the drum to engage in the notches of the flange on one of the master gears, thus locking the differential.

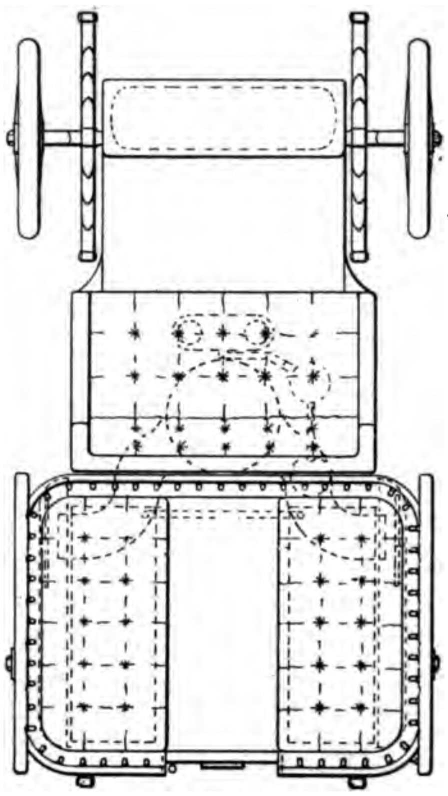
In order to disengage the block from the projection the engine must be reversed and given a partial turn, whereupon a spring connected with the operating mechanism will return the block to its normal position. Then the engine is again reversed and all parts, including both sections of the shaft, are driven together and the vehicle is propelled out of its stalled position. When the conditions are again normal, the engine is reversed and the block again thrown toward the drum to allow the projection to strike its opposite side. This reverses the position of the lever outside the drum and withdraws the pawl from the notch in flange, and allows the compensating gear to perform its usual function.

705,630. Separator for Electric Accumulator Plates.—Richard Alexander-Katz, of Berlin, Germany. July 29, 1902. Filed October 18, 1901.

A non-conducting separator for electric accumulator plates comprising two wide meshed gratings of rubber or celluloid, whereof the intersections of the one cross the open spaces of the other, the outer edges of the gratings all being in the same plane.

705,824. Automobile.—S. T. Davis, Jr., of Ardsley-on-Hudson, N. Y. July 29, 1902. Filed February 8, 1902.

Refers to the arrangement of water tanks and flues in a steam wagonette. The hood of the boiler has two divergent outlets, leading respectively to the sides of the vehicle body, where they enter longitudinally arranged flues. These flues are provided with outlets in the form of distributing perforations in the side walls thereof. Within these flues and directly in front of the discharge ends of the outlet branches have been provided baffle plates, which act to distribute the products of combustion along the flues and prevent the same from escaping in objectionable volume through the perforations immediately adjacent the ends of the outlets. In a wagonette these longitudinal flues may conveniently be arranged beneath the overhangs and as ornamental supports therefor. The water tanks are arranged under the rear seats.



No. 705,824.

705,790. Two Speed and Differential Gear for Motor Vehicles.—John C. Robbins, of Waltham, Mass. July 29, 1902. Filed October 31, 1900.

705,881. Gas Engine Ignition Regulator. —M. J. Sullivan, of Springfield, Ohio. July 29, 1902. Filed January 13, 1902.

The regulation is either effected by manual adjustment, so that the successive explosions will occur at any predetermined point, or effected automatically, so as to vary in accordance with the running conditions of the engine.

705,892. Steering Merchanism.—Frederic E. Allen, of Boston, and R. H. Danforth, of Salem, Mass. July 29, 1902. Filed December 17, 1900.

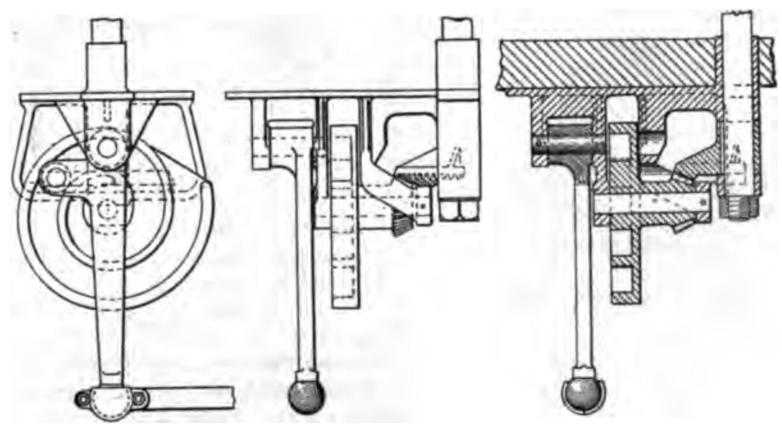
The invention involves the use of a grooved convoluted locking and actuating cam operating upon a member which has a circular stud engaged with a single convolution only of the groove of said cam at a time, the mechanism being thereby distinguished from devices in which a worm or other gear coacting with a multitoothed complemental gear member is employed.

The principal objects of the invention are to enable the cam and associated parts when it is desired to locate the same upon the vehicle body to be mounted close to the body, while at the same time maintaining their proper relation with the mechanism of the underframe of the vehicle, and also to prevent backlash and provide for different rates of movement of the member coacting with the cam in different portions of the stroke of the cam. It has been proposed heretofore to employ in a steering mechanism a cam of very steep pitch, so as to obtain the full range of movement of the steering wheels in a partial rotation of the cam. It is difficult to make this form of mechanism sufficiently compact to render its use desirable on vehicles, and it is further necessary to make the pitch of the cam so steep that a uniform locking action, with absence of binding or cramping at all points of the stroke of the cam, is not easily attainable. Steering mechanisms using a worm or other form of locking gear coacting with a multitoother complemental gear are open to this limitation, among others, that the movement of the complemental member in each cycle or revolution of locking gear is a repetition of its movement in other cycles or revolutions, whereas it may be desired to obtain a different rate of movement at the ends of the stroke of the complemental member than in the intermediate portion of said stroke. The convolute cam mechanism enables the inventors to obtain this difference of movement in different parts of the stroke, and the construction adopted further avoids backlash and overcomes friction.

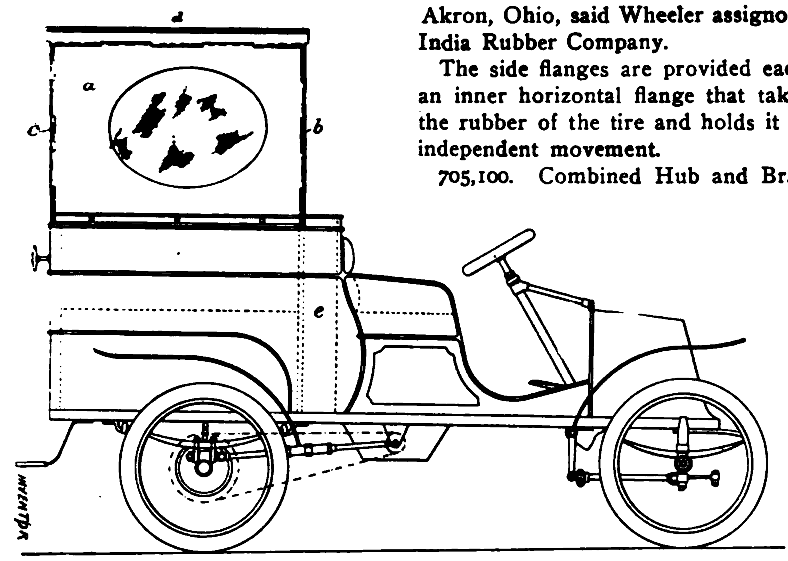
705,995. Carburetor for Explosive Engines.—George A. Graves, of Joplin, Mo. July 29, 1902. Filed October 15, 1901.

705,572. Safety Valve.—William C. Field, Decatur, Ill. July 29, 1902. Filed March 31, 1902.

705,624. Motion Transmitting Device.—Charles F. Stokes, Chicago, Ill., and Charles E. McGlinchey, Highlandville, Mass. July 29, 1902. Filed November 9, 1899.



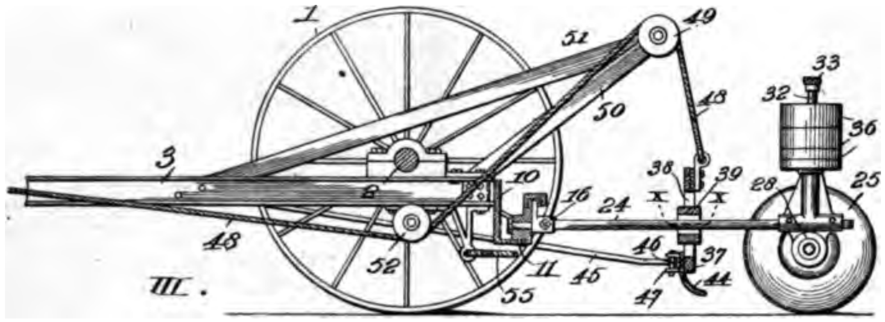
No. 705,892.



No. 705,402.

705,402. Motor Car.—William C. Holley, of Westminster, England. July 22, 1902. Filed April 18, 1902.

Means for converting a closed car to an open car. The front, sides and back parts are arranged to be lowered into recesses in the lower part of the body, rack and pinions being employed for lowering and raising said parts. The roof parts fold upon the sides and are raised and fitted together for use.

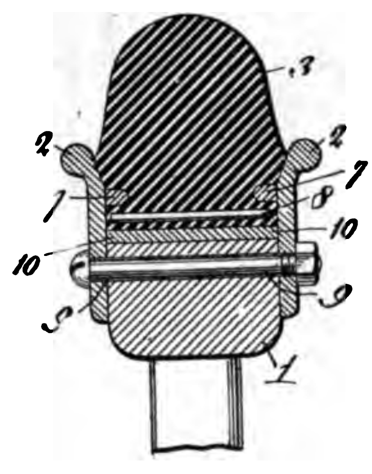


No. 705.337.

705,337. Motor Plow.—Richard J. Gatling, of St. Louis, Mo. Filed September 6, 1901.

The main feature of the invention appears to reside in placing different weights over the plow members to regulate the depth of soil to be plowed.

705,178. Solid Rubber Tire.—Charles H. Wheeler and Franklin W. Kremer, of Akron, Ohio, said Wheeler assignor to the India Rubber Company.

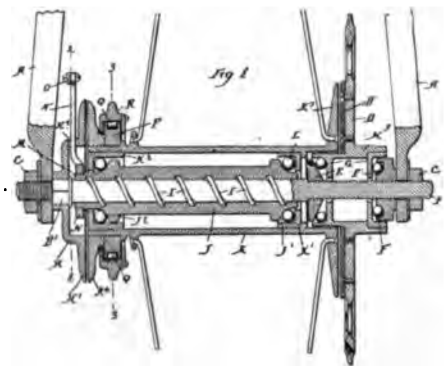


The side flanges are provided each with an inner horizontal flange that takes into the rubber of the tire and holds it against independent movement.

705,100. Combined Hub and Brake for Motor Vehicles.—Frank L. Flem, of Philadelphia. July 22, 1902. Filed February 28, 1901.

The driving wheel is connected to the motor driven sprocket wheel by frictional means, permitting the machine to start slowly without jerking.

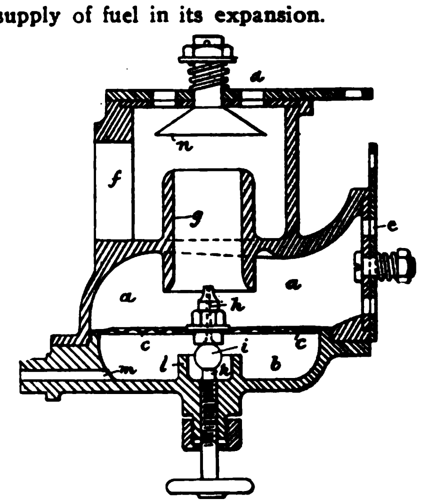
The adjustment of frictional contact is made by a screw thread and can be finely regulated, permitting the motor to run at high speed when climbing hills.



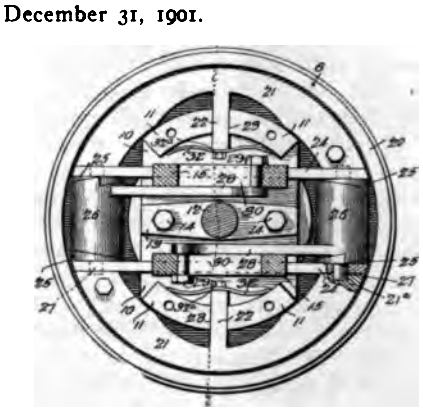
No. 705,100.

705,314. Carburetor.—Francis C. Blake, of London, England. July 22, 1902. Filed November 5, 1901.

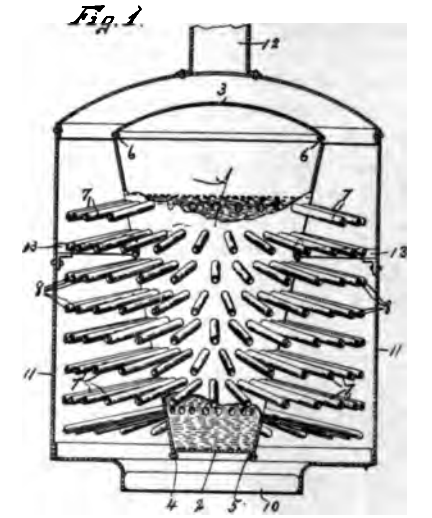
In this carburetor a flexible diaphragm separates the gasoline reservoir and a vacuum chamber, a spray nozzle rising out of the diaphragm. As the charge is given off to the motor the vacuum created draws the nozzle valve from its seat and permits a new flow of spray; the diaphragm at the same time drawing a new supply of fuel in its expansion.



705,273. Clutch.—Herman Moon, of Grove City, Pa. July 22, 1902. Filed December 31, 1901.



The power shaft and idle pulley are clutched together by friction jaws disposed within the flange, which latter are operated to expand them by cams, a hand wheel being employed to communicate the necessary power.



705,533. Steam Generator.—Charles F. Kitts, of Oswego, N. Y., deceased. July 22, 1902. Filed March 9, 1901.

The water shell has inclined side walls, being in the form of an inverted truncated cone, and the water tubes project from the side walls radially.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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The Chicago Endurance Contest.

The 100 mile endurance contest held by the Chicago Automobile Club on August 2 was a fair success in various respects. The number of entries, although not nearly as large as in the contests held in the East earlier in the season, was fully as large as could have been expected, considering the time, locality and the apparent abundance of orders with most of the leading manufacturers at the present. The general public took a keen interest in the affair, and the proportion of starters that finished within control time was greater than in previous contests of the kind held in this country, notwithstanding the fact that with a few exceptions all the competing vehicles were of the runabout type. This latter fact points to a comparative easiness of the contest due to the good roads which the route covered. It is true that some stretches were a little sandy and called for a little more power than required on hard road surfaces, but there was very little of the hard, rough and rutty road surface which puts such severe strains on the running gear and delicate motor mechanism.

The new feature of the contest, the word of honor pledge of speed rule observance, did not work out very satisfactorily, as is shown by the facts that several contestants were disqualified, one arrest was made for illegal speeding and that gross violations of the speed rules were reported from several points along the road. It might really be expected that automobilists would be more careful with regard to breaking their word of honor. The rule is, of course, defective in principle, as not the driver but the entrant is required to give his word of honor and these are not nearly always one and the same person.

It appears from the report of time of start and arrival of the vehicles, published in our last issue, that there were no such violations of the speed rules as in the Long Island contest last spring, in which a number of the participants simply made a race out of the contest and intentionally made themselves subject to disqualification. The speed excesses shown by the total time consumed were slight in every case, and it is more than probable that quite a few of those who were disqualified have to ascribe their loss of a ribbon to an attempt to make every control on the minute in minimum permissible time. We take occasion here to reiterate that absolutely nothing can possibly be gained by this, while every chance of winning an award is quite easily lost by such an attempt. Provided the maximum time limit of twelve and a half hours is not exceeded the speed cuts absolutely no figure in the award. The contestant who consumes eleven hours in making the 100 miles secures the same ribbon as he who arrives at the finish in the minimum time of seven hours fifteen minutes, if the stops have been the same in each case. It is therefore strongly to be urged that in future endurance contests the contestants keep well within the speed limits and avoid trying to make controls on the minute. There will then be less cause for disappointment. The stand of the club in enforcing the disqualification measure is to be commended.

The fire accident, which rather marred the contest from the standpoint of the public, deserves the most searching attention. It is well known that under ordinary conditions the chances of a gasoline automobile with electric ignition taking fire on the road are infinitesimal. From the report of one of our representatives it appears probable that the accident was due to a detached gasoline container carried in an inappropriate place. On the occasion of the A. C. A. 100 mile contest we called attention to the danger of filling main tanks from auxiliary tanks while the vehicle was in motion and urged the revision of the rule permitting this. Why should detached gasoline containers be carried in an endurance contest? They are carried only very rarely in actual touring, and it is an exceedingly easy matter to provide a gasoline carriage with sufficient gasoline tank capacity for a run of 100 miles.

We would suggest that the Chicago Automobile Club make an investigation into the cause of the accident and furnish the result thereof to the press for publication; and, further, that in all future contests it

be prohibited to fill gasoline tanks from detached containers while in motion, irrespective of whether this particular accident be found due to this cause or not. This practice is in any case a most dangerous one.

Detachable Tonneaus.

Tonneau bodies that may readily be attached to or detached from a motor vehicle are in great demand in this country. In the usual design such a body consists of a main seat, a sloping box in the rear and tonneau seats, which are attached to the inclined board forming the cover of the box. Invariably this cover consists of two hinged doors, which can be opened, readily when the tonneau is not in place, but which cannot be opened until the rear seats have been taken down. The ease with which tonneaus may be attached or detached is one of the points that the agent never fails to make to the intending purchaser: "You have but to remove those four nuts and lift off the tonneau." This can be accomplished within a few moments, and the novice will be an expert at it long before he masters the levers.

The question is: Is it proper and safe to secure the tonneau by means of nuts and bolts? In the light of experience this must be answered in the negative. It may be well to cite an instance in this connection. A party of automobilists were driving in a heavy tonneau touring car in New Jersey recently, when the tonneau, without warning, slid down from the inclined rear box and dipped its occupants into the road. One of them, it was said, had his neck broken. Whether, in this particular case, the fall caused any of the passengers to be injured or not, has little to do with the point at issue. It is to be expected that persons violently precipitated to the ground by a tonneau, which has become detached while en route, will sustain bodily injuries of a serious character. Nuts that are employed to secure the tonneau part are usually not kept in place by split pins, which would prevent prompt removal. Then, again, the split pins would be liable to be left out when replacing the rear seats. The car referred to, which deposited the rear seats and its occupants, had a tonneau which was held by four bolts and nuts. The theory is that they had not been well tightened and worked loose by vibration.

Here is an opportunity for a designer to work out an attachment that will secure the rear detachable part of the body as well as nuts will, but, unlike them, be safe. There are many simple ways of solving the problem, and it behooves manufacturers to take it up and find a solution, in the interest of the motoring public.

Important Storage Battery Decision.

As briefly mentioned in our last issue, Judge Kohlsaat, of Chicago, on July 23, refused to issue an injunction prayed for by the Electric Storage Battery Co. to restrain the Porter Storage Battery Company from manufacturing the Porter automobile batteries. The suit for an injunction against the Porter Company followed close upon the issue of an injunction by Judge Hazel, at the instance of the same complainant, restraining the Buffalo Electric Carriage Company from using the Porter battery.

Judge Kohlsaat's refusal to issue the injunction asked for by the Electric Storage Battery Company is based on the principle of law that no subsequent patent shall interfere with the rights of the public to enjoy and use a patent which has expired. The effect of the ruling is that the Porter Company may sell its batteries any place in the United States. The Buffalo Electric Carriage Company, owing to the injunction, cannot use the Porter batteries in the machines it turns out, but there is nothing to prevent a person to buy a carriage minus battery from that firm, buy a Porter battery from the manufacturer thereof and equip his carriage with it.

The present decision may signal the end of the monoply in pasted electrode storage batteries. It is reported, however, that the case will be carried to the Court of Appeals by the complainant.

Systems of Making Awards in Contests.

The system of awarding blue, red, yellow and white ribbons for performances in endurance contests, as originally adopted by the Long Island Automobile Club, seems to meet with general favor, and is being copied extensively by other clubs. One feature of this system is open to objection, however, namely, that "very highly commended" and "highly commended" certificates are given to vehicles making the poorest showing among the competing vehicles receiving awards. Doesn't the phrase "very highly commended" seem to imply that a vehicle so awarded made a first class record? If awards are to be made to all vehicles making a percentage of over 80, why could not the range of percentage entitling a contestant to either a red, yellow or white ribbon be extended. Or if it should be deemed preferable to have more than four different awards, ribbons of other than the above four colors might be added, i. e., substituted for the V. H. C. and H. C. certificates. This would render the system more logical.

The Rising Price of Gasoline.

The price of all commodities has shown an upward tendency in recent years, but there is probably no parallel to the enormous advance in the price of gasoline. In 1899 gasoline suitable for internal combustion engines sold for 7 cents a gallon while now the retail price is 18 to 20 cents —an increase in four years of nearly 200 per cent. The chief cause for this enormous rise in price is undoubtedly the great increase in the demand for this fuel, both for domestic and motor purposes. It is quite certain that the use of liquid fuel will still be largely extended in the next few years, and as it will be impossible to increase the supply in proportion to the demand the price of gasoline may be expected to go up until a satisfactory substitute is found.

Meanwhile the experiments conducted with a view toward adapting other fuels to automobile use continue, both here and in Europe. Here kerosene is considered to offer the best solution of the fuel question, while abroad the adaptation of alcohol is pushed most vigorously. And we are glad to state that progress is being made all along the line. To those who are working on the difficult problem of a practical kerosene burner for steam carriages or a practical kerosene carburetor for explosive motors, the rise in the price of gasoline will undoubtedly be welcome news. For it will have the effect of causing the automobile public to content itself with a less perfect device, one perhaps a little less convenient, to profit by the lower cost of kerosene.

The day of a general application of kerosene burners seems to be in sight. One leading manufacturer, as announced elsewhere in this issue, now gives purchasers an option to have either gasoline or kerosene burners fitted, and others may be expected to follow suit in the near future. Much interest is also being taken in the kerosene burner problem by inventors not directly connected with steam carriage manufacturers.

rmation of the Daily Press.

st be considered as misleading to ral public to designate a non-stop held under the regular legal speed a race. Yet every report of the Chicago contest in the daily press come to hand referred to it either uto race," a "motor race" or an ice race," and the term "race" have been very generally applied ontest outside the press also, since d to quite an extent in the cor- nce received at this office dealing event. With speed entirely elim- a factor in the contest the term misapplication. It is to be rec- ed that the contest officials in nts impress it speciallly upon the s that it is not a race, but an en- contest, and that the former term ot be used.

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tarding Effect of Promised Perfection.

By Albert L. Clough.

osition of the electrical vehicle in mobile field is at the present time peculiar one. Totally unable, as it s time, to take any substantial part most popular phase of self pro- affic—country touring—it yet holds allurements as to its possible fu- at a vast number of people who ike to be owners of motor vehicles erred from considering the other powers. The electric vehicle is a veritable "dog in the manger," g only a small demand itself, but ing by its momentarily expected ement a vast number of people aking use of the steam and hydro- systems.

ricity is a name to conjure by, and her unsuccessful career thus far of ctromobile is illumined and ren- ess dismal by the successes of the and other electrical applications. erfectly astonishing to one who is stantly talking "automobile" with neral public what an enormous of people are awaiting the ideal on of the electric vehicle by a cer- eat inventor, to whom the daily not the electrical journals) attribute ers of a wizard. Go into the small- n, no matter whether it be located and bank, with neighboring hills give one a "crick in the neck" to them, and no matter whether there electric plant within 20 miles, as one stops and answers negatively vitable question, "What's the mat- ke down?" one is sure to be ac- by a very wise resident in the fol- manner: "Say, is this one of them d carriages that I see about in the *Hurricane*, that —— has invented? I am going to have one of them things when they are perfected." When you admit to him that your vehicle is of the gasoline type he loses all interest and cites instances of unlucky and lamented servant girls who used the wrong can by mistake. In the meantime small boys are making frantic assaults upon your tires with various instruments of puncture, with the amiable purpose of ascertaining whether they are pneumatic or solid.

The potential popularity of the electric vehicle is certainly astonishing and speaks well for the persevering press agent. What a splendid glamour there is about electricity anyway! The person or the institution which can judiciously feed the public upon what he is going to do is in an enviable position, as he is not open to criticism, and there is a halo about him. Our late friend Keeley understood this. The man who has really done something lays himself open. You can smell his vehicle and hear it while the vehicle of press interviews and blue prints is odorless, noiseless and runs forever for nothing. Now the right thing to say to your friend of the *Sunday Hurricane* is to evince a polite surprise at his wide reading, and to hope that it is all true, and this hope may be entertained in all candor by any true friend of mechanical traction. We do all hope for some good achievements on the part of the storage battery, and have been hoping ever since the days of Planté. Certainly this is no time to stop hoping when an inventor of most distinguished reputation is working with a new chemical reaction and materials of structural sufficiency. A perfectly reversible chemical reaction in active material of conductivity and diverse electro chemical position and capable of mechanical stability is what is required, and this, it is claimed, has been secured.

One can see how the prospective purchaser of a vehicle for exclusive use in a great city may well await storage battery development, especially at this stage which the published reports render so hopeful; but one is equally sorry for the prospective general user of the automobile who may be awaiting this much longed for consummation; sorry for the splendid fun he is missing. When I see the fine gasoline tonneaus rolling through town on their way to the White Mountains, with their happy freights, I am glad indeed that they did not wait for the storage battery, and I will warrant that their owners, despite their inevitable troubles, are gladder still. There is plenty of time to wear out a good gasoline or steam rig before this country outside of the great cities would be put into shape to afford proper charging facilities except on narrowly prescribed routes, if the perfect storage battery were marketed tomorrow. In the rural parts of the country which offer the greatest incentive to touring there are practically no charging facilities today, and this is likewise true of most small cities and towns, owing to the great popularity of the alternating current and the almost total lack of a direct current supply at low tension.

Storage batteries, as is well known, cannot be charged by means of alternating current. The electrical energy must first be converted into the continuous form, and this requires either a commutator, a motor converter or a motor generator, all expensive and complicated pieces of apparatus. Such an apparatus must in general be installed at every point where charging is to be effected outside the great cities. The trolley current, although of the continuous variety, is equally useless for charging purposes, as it is of too high pressure and must be reduced to about a fifth of its tension by means of a motor generator. The idea cherished by the public that one may "hitch on" to a wire anywhere and "juice up" is unfortunately an idle dream. There is no likelihood of any extension of the direct current supply outside of metropolitan communities; in fact, all tendencies favor the universal use of the alternating system. The storage battery has not deserved consideration in the past in laying out systems of electrical distribution, and it is somewhat late to make its claims heard, if it has been reformed of its evil ways.

One peculiarity of the storage battery and the compressed air vehicle, both of which require special charging facilities, is that in every instance the vehicle must be brought to the prescribed charging point. If one runs short of gasoline on the road one may walk to the next grocery store and bring back a can full, but one cannot bring back a can full of electricity for his stalled electromobile, but must surrender to the despised "hay motor," who can take supplies wherever the grass grows. Any vehicle which operates by means of stored energy, and is not fitted with a prime mover, must always find its ideal sphere of usefulness in operating between predetermined points over a more or less closely predetermined route, and not in general transportation work.

It is an actual fact that thousands of people are waiting for the electric wagon, in ignorance of these limitations which cannot be overcome for years, no matter how good a battery may be at hand. If this battery proves all the claims which are made in its behalf, it will enter into a magnificent sphere of usefulness, but the current statements in regard to it are highly misleading and pernicious to people not thoroughly versed electrically, and are preventing a great many persons from enjoying the royal pleasures of automobiling, which may be perfectly realized by means of the present vehicles.

Too long a period of waiting for the perfect electric automobile may terminate for many a would-be chauffeur in that grim ride in the vehicle with the glass sides and black plumes. Let us keep our eyes on the things that are and not miss their joys by a dependence upon what anybody says he is going to do.

CHICAGO ENDURANCE CONTEST.

On a Rambler, No. 16.

By Thomas I. Stacey.

The term "sweetly," as applied to the running qualities of an automobile, which seems to be a favorite one with many drivers, can certainly be appropriately used with reference to the machine which it was my good fortune to draw as official observer in the 100 mile endurance test of the Chicago Automobile Club. It was with considerable satisfaction that I found that No. 16, which had fallen to my lot, was a Rambler gasoline runabout. I had heard a great deal of the Rambler machine and was particularly anxious to test its running qualities as compared with my own runabout of a different manufacture, but quite similar in many respects. It was also a satisfaction to know that the machine was to be operated by Charles Jeffery, a son of the manufacturer, which guaranteed its being handled in a competent manner.

We were a little late in getting ready for the start, and thereby lost our regular place in the line and were not started until 9:20 or twenty minutes after the regular schedule time.* On starting, each observer's watch was set at 9 o'clock, without reference to the actual time of the start, so that it would be an easier matter to figure on the time for each control point, as a schedule had been furnished showing that the first control, 15 miles, must be passed at 10:15, and the second control, 15 miles further, at 11:15, and so on all along the route. The course had been divided into six controls of 15 miles each, and 10 miles from the last control to the finish. Each of these seven sections was to be made in not less than one hour, except the first, which was not to be taken in less than one hour and fifteen minutes.

The Chicago Automobile Club is certainly to be congratulated on the successful manner in which the test was planned and carried out. The course was marked with arrows, but in addition to this a very clever plan was used for still more clearly marking the course. The first three machines carried confetti and scattered this along the road at each turn and at other points where it might be at all difficult to follow the road.

We were very successful in getting through the crowded part of the city and across several street car lines and the Jackson boulevard bridge without a stop of any kind, either penalized or otherwise; in fact, we made the whole run without a non-penalized stop of any kind, our only stops being two penalized stops of short duration. While, of course, non-penalized stops do not count against a machine, there is, nevertheless, considerable satisfaction in avoiding them. We had a narrow escape from a non-penalized stop when nearing the end of our journey, as the Rush street bridge was just about to open as we reached it and I believe was held long enough to let us go over; at least, ours was the only vehicle of any kind upon the bridge at the time, and it commenced to turn the moment we had passed over.

Charles Jeffery in His Rambler, No. 16.

The course between the controls had been marked with banners at the 5 and 10 mile points, to enable the drivers to more accurately regulate the speed of their machines. We, however, failed to find either the 5 or 10 mile banner on the first section, with the result that we found ourselves within a mile of the first control a considerable time before we should have been there and were obliged to do some very tedious "loafing" for the last mile, and even then we passed the first control point at 10:12, or three minutes ahead of schedule time. The banners had apparently been removed by the irrepressible small boy, not only here, but all along the course, as fully one-half of the 5 and 10 mile banners were missing, and had we not both been more or less familiar with the course we would have had great difficulty in regulating our speed. It has occurred to me that the confetti idea, which is certainly a good one, might be carried further and blue confetti scattered at the 5 mile point and red confetti at the 10 mile point by the first car, which could be occupied by those familiar enough with the course to know the 5 and 10 mile points by some prominent landmark. A mark of some kind on the ground would certainly be preferable to a banner nailed to a tree or telegraph pole. Another plan might be to pour a streak of blue calcimine across the road at the 5 mile point and a streak of red at the 10 mile point. This might be done the day before, as it could not be entirely obliterated even by a heavy rain.

The only bad road in the first section was 2 or 3 miles on Harlem avenue in Oak Park. About half of this distance is an old cedar block pavement in wretched condition, with a double line of street car tracks. The other half is an old macadam road, which has long since seen its best days and is full of holes and ruts. We had no difficulty, however, as the machine took the road splendidly on the high speed and the springs were fully capable of taking up the bad jolts and making it not unpleasant riding, even on so rough a road. The machine was behaving beautifully and I was surprised at the speed and power that it developed and the ease with which it was controlled.

On Grand avenue, just before reaching the first control, we had passed No. 22, locomobile, pulled up at the side of the road, but did not learn what was the trouble. We had also passed in the order named, No. 31, No. 23, No. 30 and No. 15, all "loafing" and killing time so as not to reach the first control ahead of the schedule.

Shortly after leaving the first control we passed No. 23 stalled on the side of the road, evidently undergoing repairs. No. 23 was a home made affair, being an old buggy worked over into an automobile, with the least possible alteration. An air cooled motor of some kind had been hung under the body and operated the vehicle by rope transmission from two small pulleys on the engine to a grooved wood pulley face which had been clamped to the rear wheels of the buggy near the rims, something after the manner of the transmission arrangement of a motor cycle. The driver of this outfit seemed to take his vehicle seriously, but I think everyone else considered it a good deal of a joke. My sympathies were with the official observer on this freak car, as it was over twelve hours on the course and just got in a few minutes inside of the maximum time allowed of twelve and one-half hours.

We passed the second control just on time at 11:15, after having traveled some

A. Murray on the "Rutty" Pike.
Interested Outsiders.

No. 29 (Darracq) on Prairie Road.
Stopped for Repairs.

very bad country roads with numerous treacherous ruts which required the greatest skill on the part of the operator to avoid, as it was hard to see them until they were dangerously near. Along this part of the road we passed quite a number of farmers standing at the roadside with their horses, with the evident purpose of getting them accustomed to the automobiles. I think this indicates that the farmer is satisfied that the automobile has come to stay and that he must make the best of it, which is certainly a very wise conclusion on his part. The machine was driven on the high speed regardless of the road and Mr. Jeffery certainly did not spare his vehicle in any way. I would have been very reluctant to put my own machine through any such use, and yet our car seemed to stand the terrific jolts and racking without a strain of any kind. Mr. Jeffery stated that the machine was their standard article in every respect, with the exception of a slightly larger gasoline tank. The tail board of the machine had been fastened so that it was left partly open, but this precaution seemed to be unnecessary, as the machine did not become excessively hot, at least as far as I could tell from reaching back over the seat and feeling the heat rising from the ventilated deck. The hill climbing gear was only used a few times on the whole trip, and then only a few moments when nearing the top of some particularly steep rise, as most of the inclines were taken on the high gear. I noticed that Mr. Jeffery seemed to have to hold the hill climbing lever in place when using it. He explained that ordinarily this was not necessary, but in some way the catch which held the slow speed lever had been omitted from this particular machine. He stated that the machine had been run a considerable distance and was not a new machine just from the shop. Mr. Jeffery adjusted the gasoline supply quite frequently, explaining that he was anxious to run on as small a quantity of gasoline as possible to prevent the possibility of smoking the sparking plug. The necessity of this frequent change of the gasoline supply was not apparent to me in the running of the engine, but I suppose that Mr. Jeffery's greater familiarity with the machine enabled him to detect symptoms which were not apparent to me, although I am accustomed to watch this matter very closely on my own machine.

We passed the third control also on time at 12:15 and were running so smoothly that I began to look forward to a perfect run, as there seemed to be no reason why the machine should not run on indefinitely as it had so far, as there was certainly no indication of any difficulty of any kind. Shortly after leaving the third control we were passed by No. 24. A little further along we came upon No. 26 undergoing repairs or adjustment of some kind at the side of the road. Not very much further along No. 30 was stopped, apparently in trouble. We did not know just how many machines had started ahead of us, but some of the spectators were evidently keeping track of the machines that passed by and during the early part of the run we were told that we were the twenty-fourth. Then it worked down gradually until we were told that we were the tenth, which was very satisfactory from our point of view.

In passing through Waukegan we saw No. 6, Oldsmobile, evidently stalled on account of tire trouble. The street which the course followed through Waukegan was Genesee street, but the bridge across the river on this street was closed for repairs and it became necessary to make a detour of three squares to get across the river and back on to Genesee street. Part of the detour was over very bad roads, which we were taking on the high speed but with the engine throttled down to run slowly; suddenly without any warning the engine stopped and we had met our first setback. Mr. Jeffery jumped out, and after throwing the switch over on the second set of batteries started the engine without serious difficulty, although he had to "crank it" several times before it started. He seemed to think that the first set of batteries had given out, but I think there must have been some other cause, as the engine had not been missing explosions or giving any other indication that the battery was weak. At any rate, the stop lost us a minute and a half and the chance of winning a blue ribbon. Shortly after this we passed the fourth control, on time, at 1:15.

After leaving Waukegan we came upon the sensation of the day, which was the destruction by fire of the Elmore gasoline machine. When we first saw the flames we wondered if it could possibly be a machine on fire, and were loath to think so at first, but as we came nearer we could see that the flames looked like a gasoline fire and we began to think that one of

the "steamers" had met a fiery fate. Imagine our surprise on coming up to find that it was a gasoline machine. The numbers and a good part of the machine had been consumed when we reached it, and we did not know until we arrived at the club house that it was the Elmore that had met with such hard luck. I presume that the cause and details of the accident will be discussed fully in the columns of THE HORSELESS AGE. The road on this part of the course, and in fact all the way from Waukegan to Fort Sheridan was very bad, but we got along very successfully and had no difficulty in keeping up an average speed of 15 miles an hour, notwithstanding the bad roads.

Just after passing Lake Forest we came upon No. 29 stalled on the side of the road and evidently undergoing adjustment. In Highland Park we passed No. 15, Rambler, and they shouted to us that the intake cam had come off. They evidently were not delayed very long, as they followed us quite closely at the finish. A few miles further along we passed No. 7, Oldsmobile, stopped while one of the occupants was taking a picture. Whether this stop was penalized or non-penalized I did not learn, but they did not appear to be doing anything with the machine. It was not very far beyond this and just at the fifth control that we had our second and last stop. A strong gust of wind caught our record card and blew it out of the vehicle. Mr. Jeffery put the machine into the slow speed and I jumped out to pick up the card and overtake him, and while he was thus running slowly the engine stopped, just beyond the fifth control, which we had passed at 12:27, just two minutes late. Investigation showed that the transmission on the main shaft had stuck, probably from slight overheating, due to insufficient lubrication. This part of the machine is lubricated by squirting oil into it with a pump through an opening that is provided in the side of the vehicle. After squirting oil in twice and pushing the vehicle forward perhaps 100 feet on the road, to work the oil into the parts, the transmission loosened and Mr. Jeffery was able to start the machine, but not without "cranking it" several times. This stop lasted twelve minutes and was the last of our troubles, as we passed the sixth control at 3:17 and finished at 4:12 without any incident worthy of note.

The showing of the machine for the course was very satisfactory. That a machine with a 4½ horse power engine and weighing 1,200 pounds could successfully cover 100 miles of road, some of it very bad, at an average speed of 15 miles per hour, with only two short stops, certainly speaks well for the light gasoline runabout and makes it a formidable competitor of the heavier machines, even for touring purposes. I believe that when the results are summarized the striking feature of the contest will be the successful work of the light machines.

Observations on the Road.

By HENRY K. HOLSMAN.

On the evening of August 1 some interesting views of the road were thrown on the screen, and a very enthusiastic description of the road was given to a small but interested audience at the Automobile Club House by R. Harry Croninger, chairman of the contest committee. Great stress was laid upon the very bad roads to be encountered in this course, but as a matter of fact the roads were very excellent country roads and for any horse vehicle would be considered as good as a boulevard, save possibly for the dust and a few slight ruts over which, if the horse should walk or go at a slow pace, the occupants of the vehicle would feel no discomfort, and in most cases would notice no inequality in the roads.

On the morning of the contest there was considerable confusion in getting the automobiles in line in proper order and in getting them supplied with official observers. It was emphatically stated at the lecture on the evening before that the numbers of the contestants would be placed on cards, face downward on a table, and the observers would be called upon one by one to choose a card. Having chosen a number the observer must go with the contestant indicated by that number or not go at all, and a good deal of emphasis was put upon the rule that no exchange of numbers would be allowed under any circumstances. Scarcely one-third of the numbers were drawn before one observer after another reported back to those in charge that the "car" whose number they had drawn was not in the race, whereupon they were allowed, after slight hesitation, to draw another number, with the result that when the time came to start, for some of the vehicles there were no observers.

After the contestants were all started the writer took a train and posted himself along the worst roads of the route, between the towns of North Chicago and Lake Bluff. At this point there were soft roads during the rainy season and the heavy teaming had formed ruts in the road and occasionally a hole into which the wheels of one side of the vehicle would be obliged to go unless the driver turned out of the beaten track. The writer measured a hole about 3 feet in diameter and 4 inches deep, in the deepest part of which the wheels of one side of the vehicles would be obliged to pass, owing to rough roads on the left of the course and a fence or embankment railing on the right. Most of the heavy so called touring automobiles, especially of the tonneau type, slackened their pace on approaching this hole, but the passengers were nevertheless thrown almost entirely out of their seats. Most of the light automobiles of the long spring type passed over the hole without slackening their speed and without any apparent discomfort to the passengers, though it must have been a considerable strain upon the small wheels and light running gear of many of the light vehicles. The ruts in the road were not narrow and deep cut, as they often are in country clay roads, but were like beaten paths 8 inches or 10 inches wide, having little ridges on either side. The depth of these pathlike ruts amounted occasionally to as much as 6 or 7 inches. Some of the mechanism suspended beneath some of the automobiles would touch the ground. This was especially noticeable in one type where the differential gear and brake is enclosed in a case on the rear axle and the case comes down to within 6 inches of the tread of the wheels, so that when this automobile took the deeper ruts the differential gear plowed its own course among the clods in the middle of the road.

The fifteenth vehicle to pass the writer was a locomobile upon which no number could be seen. No. 9 had such a narrow tread that it was more difficult for it to go over the rutty places than those of the standard tread, and yet the ruts were so wide, as above explained, that the difficulty was very slight. One automobile of the tonneau type, presumably No. 24 (the number on the rear of the tonneau was turned over as it passed the writer so it could not be made out) had but three occupants, including the driver and observer. In No. 29 for a quarter of a mile before approaching the writer the observer seemed to be busy with something in the bottom and front part of the car, but everything was running nicely as it passed. As No. 8 passed the writer he noticed a peculiar arrangement fastened to the back of the seat, reaching up to the top of it, which was covered with oil and dust, and the oil had been running down over the back of the vehicle. Several of the automobiles had put on temporary auxiliary oil and gasoline tanks, evidently in order to avoid the rule that no tanks could be filled without stopping the vehicle, but this arrangement suggested danger to the writer. It had not more than gotten out of sight when it took fire and burned. A short distance further on than the burning vehicle, No. 35 had turned out of the road and the operator was working at the machinery in the hood. It was noticed that some of the engines were pounding a good deal, indicating that the bearings were not all in good shape for continuing the run. This was most noticeable in No. 13, No. 34 and No. 35.

It was a bright typical summer day, with a slight breeze blowing, and considering the weather and the condition of the roads it seemed to the writer that the contest was no adequate test of what an automobile can do and what it cannot do. It is no adequate test of endurance for any well constructed machinery to run continually at its normal speed for from seven to twelve hours, and it is no adequate test of the strength of vehicles to drive them over such roads as were laid out for this

DARRACQ CLIMBING HUBBARD'S WOOD HILL.

NOS. 1 AND 2 (WINTONS) ON HUBBARD'S WOOD HILL.

t. And yet, by the angle of the wheels on some vehicles and of the heels of others it was very apparent ither the axle had encountered too of a sudden strain somewhere or the gs in the wheels were such that they allowed to spread out at the bottom at the top.

Run Over the Course on the Contest Day.

By E. F. INGALS.

endurance run of the Chicago Auto- e Club, originally set for July 12, was oned until August 2 on account of most daily hard rains that made some roads almost impassable. The route rom Chicago to Desplaines, Wheel- ibertyville and Waukegan, and thence to Chicago. There were no sandy and no hills until after leaving Des- s.

ft the morning of August 2 in our ne machine to try to find a piece of road between Chicago and Des- s, but two or four days of pleasant er had put all the roads in good con-

ore reaching Desplaines we fell in any with another machine of the make as ours containing the official eeper for the third control station, was located a few miles beyond Lib- lle.

accompanied him to Desplaines, and finding that the roads were in good tion for all the first part of the route, pt on running, hoping to find worse

timekeeper's machine was not work- vell on account of a broken water t, which wasted the water and made cessary for him to stop a couple of for water. He also had to stop for ler oil, and then lost so much time e was likely not to reach his control n on time, as he was then only ten es ahead of the machines in the en- ce run. He asked us if we could him ahead, and we did, covering the ning miles in good time and arriving at the third control at 11:50, which was twenty-five minutes ahead of time.

The road near the third control was not very good, but not as bad as it should have been to really test the endurance of the machines. At this point, 45 miles out, twenty-five machines out of the twenty-nine that started passed us, and all were working well, as far as we could make out, and nearly all were on time; but it was difficult to check them, because we did not know exactly when the machines left the starting point. We remained at the third control station about two hours after the machines had passed. After aiding in fixing a couple of machines that brought out the timekeepers we followed over the course.

The road from the third to the fourth control station (15 miles) was full of ruts and had recently been very muddy; yet the going was good, if one kept his machine in the track and did not try to hurry. This part of the course was through a rolling country, but there were no difficult hills. On this part of the course another machine, No. 33, that had probably had trouble on the road and that was very late at the 45 mile station, came up and passed us. We found no evidence of trouble to any of the machines until we reached Waukegan, about 65 miles from the starting point. Here a two passenger Friedman machine was found that had suffered some accident to the steering gear, which evidently gave them considerable trouble during the rest of the run. They also had trouble with their battery. After leaving Waukegan on the return the roads were full of holes for about 6 miles, but nevertheless the wheeling was good in the ruts at slow speed. The remainder of the road was excellent, but comprised one hill (Hubbard Hill) 400 to 600 feet in length with a 15 to 20 per cent. grade.

About 6 miles from Waukegan we came upon No. 8, which had taken fire from a leaking gasoline tank. Most of the body had been consumed. We towed this machine to a freight house several miles down the course. The Friedman machine was also left at this station. Here we took on the drivers from these two machines. We reached the club house at a quarter past 10 without finding other evidences of mishaps.

Motor Bicycles.

By MERVIN O'GORMAN.

Good roads across a country are like thoughtful wrinkles on the brow; they are an outward sign of inward grace. There are plenty of them in England, and on the motor bicycle alone are we apparently allowed to enjoy the fullness of that grace with exercise at will and without fatigue. It is true that the two motor bicycles which I got from different makers required some intelligent attention before starting for a 600 miles trip with no more repair equipment than could be contained in a bicycle tool bag. The electrical arrangement in both cases bore clear signs of ignorance or thoughtless arrangement, so without further tests I selected one of the machines, pulled all the connections out, put new wires in everywhere, sheltered from rain those parts which were exposed to rain, and from oil those parts which were exposed to oil. As a consequence I have never been given by this part of the equipment a moment's anxiety, although the many present users of the motor bicycle will say that the "sparking" is the first and most frequent cause of trouble.

I rarely propose to go further than 80 miles each day, and now that petrol is available in every town of my projected trips I take no further trouble on the score of extra storage. The bicycle itself is a straightforward and well known appliance, its repairers are many and its spare parts easily accessible; their replacement involves no heavy machine tools, so that all anxiety on that head is safely abandoned. The motor is simple and entirely accessible. It is cooled by the air which passes over it as it moves, so that its freedom from circulating pumps and subsidiary parts enables it to be relied on with an implicit trust. At the worst I can pedal it home like a safety.

My test run was from London to Oxford, Oxford to Gloucester, Gloucester to

a neighboring country house, from that house to Cheltenham, thence to Cirencester, and so on to St. Neots and Cambridge, and thence back to London, all in an interval of time which is measured by a week end.

It is true that on some occasions I passed a police constable who felt it his duty to cast doubtful glances at my machine. He was probably revolving in his mind whether I was a motorist or a cyclist, whether a malefactor or a citizen. His frowns were not due to my endangering the public, for I obviously was not. Nevertheless, discretion has since suggested a plan for solving his technical difficulties, namely, to cease to use the motor and to continue my uninterrupted course by the use of the pedals. I rather believe that my mount thereupon becomes a bicycle and not a motor car, and my pace immediately becomes legal. In passing through Cirencester a particularly inquiring policeman raised a fat but authoritative hand, and within 3 yards I had dismounted, although my pace at the time of his imposing movement was perhaps not less than 20 to 23 miles an hour; he told me I was moving at 14 miles an hour, and with a mental quibble, which I trust I may be forgiven, I assured him I was doing nothing of the kind. "Witness how quickly I stopped." He was not convinced, but I was not summoned. Here I would like to draw attention to the cardinal engineering feature which makes any pace safe in an uncrowded road. Safety is a matter of brakes. With two powerful rim brakes I can pull up within twice the length of my bicycle.

Now, when traveling fast one's sight sweeps over the ground ahead for a distance of about 50 yards, and had our legislators but thought of this simple fact, had they but made one little tour such as mine on a motor before legislating, they would have found that the prohibition of furious driving, coupled with insistence on adequate brakes, absolutely and entirely covers the whole field of necessary and useful automobile regulation. All the other difficulties solve themselves with the aid of the common law.

For example, there is nothing more utterly abhorrent to the driver of a motor car, or a cycle for that matter, than the thought that he will run over any living creature, and this abhorrence is not entirely altruistic. A little dog who fails to realize that a car is moving because of the absence of the horse (and this is a very common occurrence) compels the driver to endure his obstruction for a hundred yards as he yelps and barks in front of the (to him) mysterious vehicle. To run him down or even to pass over a hen may be as gravely dangerous to the driver of the car as it is to the dog or the hen. A pig is the worst animal of all, because of his slippery rotundity. A dog is something between the porker and the chicken from the point of view of the automobilist.

Any and all of these introduce a slippery obstruction which yields or fails to yield in a direction which one cannot foresee, which tends to draw one's steering out of truth, and in general imperils the safety of the travelers.

It is perfectly sure, therefore, that even a reckless bounder, so long as he is in possession of his senses, will take the greatest possible care not to run over any human being who may be in his path. He may blow his horn furiously, he may appear to be scorching up at a terrific pace which the pedestrian imagines to be utterly beyond control, but it is the driver who best knows to whom an accident is really most serious, the pedestrian or himself, and unquestionably it is more serious to himself.

This leads to another interesting consideration, a consideration which will come home to every rider of an ordinary bicycle. When a pleasant and probably amiable country dame of good farmer's wifely figure is about to step from the safety of the pavement into the dangers of the high road, when she does this oblivious of modern inventions with her back turned to oncoming traffic on the left, she has not calculated or indeed given any attention to the maximum rate at which it is physically possible for her muscles to move her person forward. Normally she might take one step per second, and if the road width is equivalent to some ten or fifteen steps, any bicyclist or motor car driver knows by instinct rather than by calculation that there is no possibility of her getting into his way, though there is every certainty that she will be frightened at his sudden appearance, passage, and disappearance.

She translates her terror into a danger escaped, and thanks Providence exceedingly. This praiseworthy attitude of thankfulness, when the old woman is a justice of the peace or a constable is only reached eventually and through the thorny and narrow way of misplaced vexation, aggravated by contempt of those who can practice such a pestilential pastime, and colored with that tinge of jealousy which every animal feels at the sight of a fleeter beast than himself.

Even in this the motor bicyclist has manifold advantages. His general outline is so familiar, his noise is so much less portentous, the risk which he runs from collision so much more obvious (though, in fact, no greater), that instead of causing a nightmare he can only raise a flutter. When running by the side of a friend in a motor car I have found that horses which have stopped him for five minutes allowed me to pass unchallenged, and when to help him I held the horse's head I was blessed and he was d——d most unfairly.

With horses it is all a matter of habit. At Stoke, where a steam tramway had long infested the streets, puffing and smoking, silence and sweetness was introduced by an electric service, but the horses missed the accustomed noise, shied repeatedly at the new tramcars because of the absence of the engine. By now they have learned and are peaceful, and that is their relation to the motor "bike." In conclusion I would say that since Whitsun last I have run 3,000 miles, some of it at 20 miles an hour, a little at 30; that my repair bill has been £3 and my first outlay £50. I think that many others will do likewise.—*The Speaker.*

Control Devices of Planetary Change—Speed Gears—Lack of Positiveness.

By Hugh D. Meier.

Gasoline vehicles equipped with the planetary type of variable speed gear are, in the majority of cases, fitted with a pedal to apply the reverse clutch and a lever operated by hand to apply the clutches of the forward speeds. These constitute the clutch control devices of practically every medium weight carriage driven by a sun and planet gear. A well known make of light runabout has but a single clutch control lever for all speeds in both directions, i. e., two forward and a reverse speed. The manufacturers of a touring machine who formerly built a runabout with two speeds and a reverse and employed a pedal for the latter and a single lever for the former have placed a vehicle on the market this season with three forward speeds and a reverse. The high speed or main clutch is operated by a hand lever; there is another hand actuated lever for the intermediate and low speed clutches and a pedal to reverse motion. Thus there are motor vehicles in use with one, two and three control levers to apply the clutches of their planetary, variable speed gear devices. Obviously the means employed to set the clutches, described above, may be modified in various ways. The writer knows of a make of light gasoline automobile in which all the speeds are foot controlled. There are four pedals, one of which applies the brakes. This method is as far removed from the ideal of a single clutch lever for all the speeds as it could well be.

To apply the brake it is necessary to first relieve the clutch which happens to be in use. French control devices are designed in such a way that the main clutch is relieved automatically whenever either of the brakes are being set. But only few American motor vehicles are equipped with an automatic clutch relief device. None of them are driven by a planetary gear, but by sliding gears or a change speed device of the "individual clutch" type. The experienced operator will never fail to relieve his clutch the instant previous to throwing on the brake. The novice, on the other hand, must stop to think before he acts, so to say, and in an emergency is most likely to apply the brake without disengaging the clutch that is driving. He may relieve the clutch and forget his brake or fail to reverse and

ibout a collision. Since the reverse s so handy and more effective than ike in retarding forward motion the is apt to stop by this means on occasion, not realizing that he is g out his mechanism and taking chances. What if his chain should ut or jump the sprocket the very it that he tries to stop by reversing oid an accident? Few operators :e on the consequences, and manu- rs are not liable to correct this bad of their customers. Should the or its mechanism fail to act for any a reverse pedal can be more ly applied than the reversing rs can be brought to act, if they to a train of shifting gears or a of individual clutches operated by : lever. This may be an excuse for reverse pedal instead of reversing ins of a hand lever. In every case one hand must relieve the clutch is to braking the other hand of the ir must grasp the steering lever or g wheel, and in an emergency the perated emergency brake could not With an irreversible wheel steer- ice the hand resting on the wheel employed to apply the emergency f steering is not required for the :ing.

isual method of securing the shafts res to which the control levers are or keyed to the steering column be regarded as good practice. The g column of practically every stand- rriage employing sun and planet s but a light tube, with a more or urely fastened bearing at its lower ity, and a light bracket or no at the upper end. The whole con- n cannot be considered to be suffi- rigid to give satisfaction at all inasmuch as there is a great ten- of the steering post to spring and shaky. The operator is often un- get the clutches to hold properly, of the "give" in the post. He re- taking up the clutches to remedy l, and frequently causes them to The writer knows of a car in which ke bands of the clutches could not ved completely. In their relief po- he machine would continue to run; y at a very low rate of speed, of

:ontrol lever of sliding gear and in- l clutch devices are equipped with a which catches in the notches of a Every notch represents a certain so that the motorist is never in whether his lever is in the correct or not. That cannot be said of or arms that apply the clutches of e which we are discussing. Today itrol lever will set the clutch in a position, and in less than a week sition may have changed 5 to 10 . If the clutch is thrown in gently not be necessary to move the lever iould it be set with a thrust, however, the lever will be moved farther than it did when shifted gradually.

Clutches, of the band type, with leather, wood or metal lining, are liable to drag and retard the whole machine. To relieve them sufficiently, so that they do not drag, calls for considerable motion of the control arms. In time this pattern may be discarded in favor of fulcrumed levers and shoes (preferably of metal). Only a slight amount of motion is required to engage or disengage a clutch. The control mechanism must be secured to the frame to insure positiveness. A single lever for all the speeds, located outside of the body, oscillating in a vertical plane and keyed to a shaft resting in bearings that are well secured, i. e., bolted or riveted to the frame, should prove to be most satisfactory of all. There is no lever in the way of the operator's knee, and the hand that has disengaged the clutch is available to apply a hand actuated emergency brake close by.

Ignition Apparatus.

By Albert L. Clough.

Minor defects are often found in the electrical ignition apparatus of automobiles which are capable of causing a seemingly disproportionate amount of trouble and annoyance. For instance: In a certain spark plug, otherwise very good, the hole for the insertion of the wire is too small and is capable of receiving only a rather frail conductor. The hole at right angles to this, which is tapped out for the binding screw, passes beyond the bottom of the hole for the wire. The result is that when the binding screw is set up tightly on the small flexible conductor this is sheared off and may open the circuit at the most inopportune moment. The point of the binding screw ought to be rounded and its hole should bottom on the hole for the wire.

Battery connections made with flexible conductors are a source of considerable trouble. The flexible wire cannot be clamped securely under ordinary binding nuts or screws unless the ends are dipped in solder, as the separate wires of the cable spread apart and the conductor flattens out under the pressure and diminishes the intimacy of the contact. Dipping the ends of flexible wire in solder makes them practically solid and enables a good connection to be had.

There is on the market a form of terminal which consists of a copper stamping in the form of a washer with a projecting lug with its sides bent together to form a little trough, into which the wire has to be soldered. The nut is removed from the battery or other connection and the washer passed over the connection screw and the nut set down upon it. This makes a good permanent connection, but these terminals would be more convenient if they were tinned at the factory to make soldering easier.

The contact points of coils, but more especially of the contact device on the secondary shaft of the engine, are too often of common commercial platinum. This contact device is subjected to very hard service and such points are very rapidly worn away and require frequent attention, which is especially irksome, as the contact device is frequently located in a most inaccessible position. There is on the market a form of platinum which is especially hardened by alloy or other treatment, which wears very slowly and is comparatively satisfactory. One should be careful to see that only specially hardened platinum is used about his vehicle.

As to the wear of contact points it may be said that it is largely dependent upon the character of the spark which takes place between them. The condenser which forms a part of the coil is supposed to reduce this spark to a minimum and with good coils this proves to be the case, but it only holds true for a given battery voltage. In some instances the platinum points of the contact device have been rapidly burned away by the employment of a battery voltage much higher than the coil makers intended, the spark from which was more than the condenser could take care of.

The vibrator adjustments of some coils, otherwise very good, are altogether too sensitive and make the regulation of the vibration unnecessarily difficult. The merest fraction of a turn will in some cases make the difference between operation and failure. The adjustment of the tension of the spring is so exceedingly sensitive in some coils as to make their regulation a very "puttering job." This adjustment should be such as to allow of a considerable turning of the screw without varying the tension of the spring but little. In this way exact results could be obtained. The lock nuts on these parts should be very positive in their action.

One should not allow the primary circuit of a coil to be closed with strong battery power unless the secondary terminals are nearly enough in contact to relieve the secondary pressure, or the insulation of the coil may be broken down.

Buffalo Automobile Ordinance.

A new automobile ordinance passed by the city council of Buffalo on August 4 provides, in brief, as follows:

All vehicles, whether carriages, automobiles, autocycles or bicycles, are restricted to a speed of 8 miles an hour within the district bounded by Porter avenue, North and Best streets on the north, Fillmore avenue and Smith street on the east and the water front on the south and west.

Outside of this limit a speed of not more than 15 miles an hour may be maintained.

At all street crossings and in rounding corners the speed must be reduced to 5 miles an hour.

The ordinance is very satisfactory to the automobilists of that city, and was, in fact, passed at their solicitation.

BEGINNERS PAGE.

"Sun and Planet" Transmission Gears.

The sun and planet variable transmission gear is very popular for light carriages. Attempts have also been made to adapt it to heavy vehicles, but in most cases the gear has been abandoned for another system after a trial. For heavy vehicles three forward and one reverse speeds were provided, but for light vehicles and as now generally made two forward speeds and one reverse is the rule. A gear of this kind is illustrated in Figs. 1, 2 and 3. Fig. 1 is a longitudinal section through the gear; Fig. 2 is a cross section through the slow speed pinions, and Fig. 3 a cross section through the reversing pinions.

The gear is assembled on a single shaft E, which may be either an extension of the engine shaft (the more frequent practice) or may be driven from the engine shaft through gears or a chain. On the shaft E are rigidly mounted two spur pinions F and G, the latter smaller in diameter than the former. The shaft also carries loose upon it a disk H, to which is keyed the sprocket pinion I, from which the power is transmitted by a chain to the sprocket wheel on the rear axle. Bolted to the disk H is another disk J, which serves a number of different purposes. It loosely supports the internal gear ring K on part of its outer circumferential surface, and has an internal gear ring L rigidly fastened to it interiorally. It also serves as a bearing support for the three planetary pinions M, which are in mesh with both the pinion F and the internal gear K. The shafts of these pinions have bearings in both of the disks H and J.

The shafts of the three planetary pinions N, which mesh with both the pinion G and the internal gear L, are supported in the disk J and a third disk O, also loose and free to turn upon the shaft E. This disk, or rather drum, O forms part of a friction clutch of the block variety and may be solidly clutched to the shaft E. The other part of this clutch, the disk P, is keyed to the shaft and the clutch is operated by means of clutch levers and a grooved collar in the usual manner.

To the internal gear ring K may be applied a brake band T and to the flanged rim of the disk O may be applied a brake band U to hold these parts stationary, as is required in the operation of this gear.

To obtain the slow forward speed the brake band T is applied to the internal gear K, thus holding it from rotating. As the pinion F rotates about its centre it causes the pinions M M M to revolve both about their own centre lines and about the centre of pinion F—in other words, to roll on the inside of the internal gear K, as indicated by arrows in Fig. 2. It will be noticed that the direction of rolling of the pinions M is the same as the direction of rotation of pinion F. As the pinions M roll around the shaft E, they, of course, take the disks K and J along in which the shafts of these pinions have their bearing, and also the sprocket pinion I, which is keyed to the disk H. Thus the sprocket pinion I turns in the same direction as the shaft E, but slower. If the pinions M were of the same size as pinion F, sprocket pinion I would turn at one-quarter the speed of the shaft E. Since in the drawing the planetary pinions are somewhat smaller than pinion F the reduction in this case is only about 3 : 1.

To obtain the high forward speed the brake band T is released and the friction clutch is engaged. This locks the disk O, which is the support for the pinions N, to the shaft E, and the entire gear, including sprocket pinion I, now revolves in unison with the shaft. The locking is effected by means of the pinions N. It will be seen by reference to Figs. 1 and 3 that, since the shaft of the pinions N cannot move with relation to shaft E, nor the toothed rim of these pinions (being in mesh with the teeth of gear G keyed to shaft E), the planetary pinions lock the pinion G and the internal gear L together. Now, internal gear L is fixed to the disk J and the latter is united with the disk H and sprocket pinion I by means of screw bolts, as shown. Hence now the sprocket pinion rotates the same as though it were directly keyed to the shaft E.

To reverse the direction of motion of the carriage the brake band U is applied, the friction clutch being now disengaged again. This, of course, holds the disk O, and consequently the pinions N, from rotating around the shaft E. Referring now to Fig 3, if the pinion G turns right handedly, as indicated by the arrow, and the bearings for the planetary pinions are held stationary, the latter pinions will revolve around their centres left handedly, and cause the internal gear L to revolve left handedly around its centre or around the shaft E. As explained before, the internal gear L is solidly united with the sprocket pinion I, and hence the latter now turns left handedly while the shaft E turns right handedly. If the pinion G has one-half the number of teeth as the planetary pinions N, the sprocket pinion will turn at one-quarter the speed at which shaft E turns.

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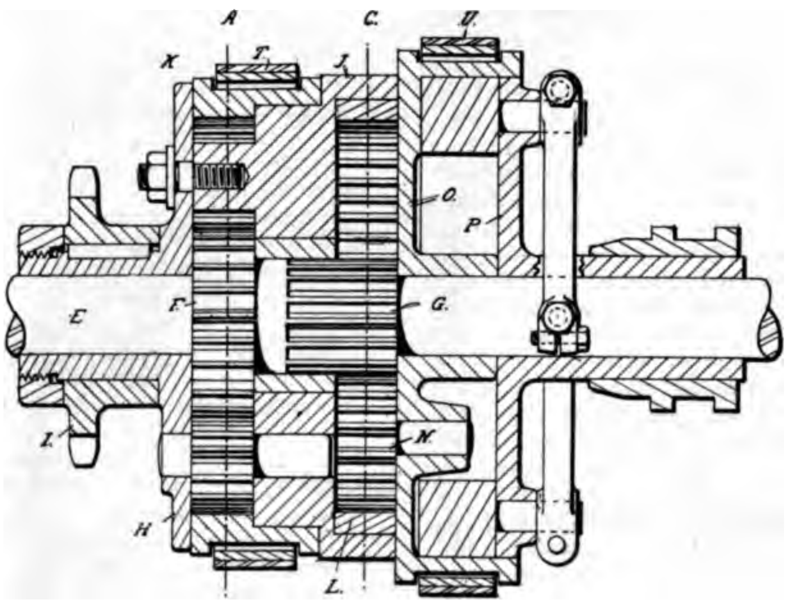


FIG. 1.

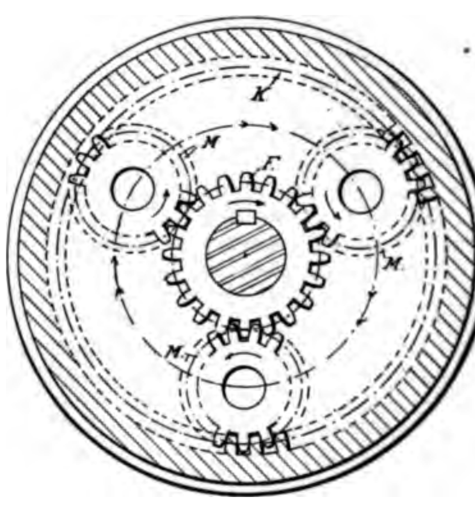
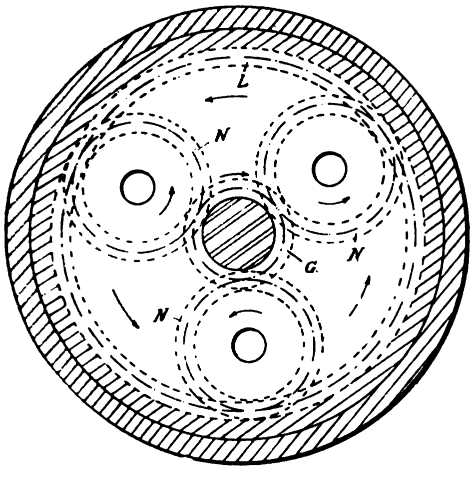


FIG. 2.—SECTION A—B.



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Some tests were made in Buffalo, N. Y., on August 2 to see how near automobile drivers can drive at a predetermined speed and also to show how ridiculously slow 5 miles an hour is.

In the first test Ellicott Evans and D. W. Sowers, in their big touring cars, tried to run a mile at what they considered a 5 mile speed. The cars just crept along and onlookers were willing to wager that they wern't going as fast as 5 miles an hour. The stop watch in the hands of John T. Gard changed their opinions. It showed that Mr. Sowers had made the mile in 6 minutes and 43 seconds and that Mr. Evans took 7 minutes and 50 seconds to do it in. At the 5 mile an hour rate it should have taken 12 minutes to run the mile.

The next test was for the purpose of showing how great is the variance of speed ideas. The course was for a mile and the participants were to run it at what they supposed to be the rate of about 8 miles an hour. The exact time should have been 7½ minutes.

W. E. Pudget was the first man over the line. He made the mile in 6 : 20, or a minute and 10 seconds faster than the right time. E. O. Mack was nearest to the mark. His time was 7 : 40. W. P. Smith went the mile in 6 : 40; C. H. Haskins in 8 : 03, P. N. Gregory in 4 : 06, and Bert L. Jones in 7 : 50.

Mr. Jones then tried to run a mile at what he considered a 12 mile an hour gait. To be exact he should have done it in just 5 minutes. His time was 5 : 29½. Mr. Mack, who followed Mr. Jones, made the mile in 6 minutes.

The last and perhaps the most interesting of all the tests was that in which several owners tried to run a mile in 4 minutes or at the rate of 15 miles an hour. That is the speed which, it is proposed, to allow in the greater part of the city. Without exception the drivers ran slower than 4 minutes. Mr. Pudget was the first man in. His time was 4 : 20. Mr. Granger went in 4 : 23, Mr. Jones in 4 : 25, Mr. Lewis in 4 : 29, Mr. Thurston in 4 : 35. The others were closely bunched.

Those who participated in the tests considered them highly satisfactory. Armed with the results the automobile owners will do what they can to convince the aldermen that what they ask is reasonable in every respect.

One Thousand Miles of Experience.

Dr. Robert Hessler, of Logansport, Ind., recently completed the first thousand miles in his Haynes-Apperson automobile, which he received on May 16 last. An account of the doctor's experience was recently published in a local paper, from which the following facts are taken:

A record is kept of the machine, a daily entry being made of the trips and the number of miles traveled, the amount of oil used, the cost of repairs and in fact any item that has any bearing on the subject. The greatest run on any one day was 65 miles. So far the services of a "hay motor" have not been required to bring the machine back to town, and no time has been lost in waiting.

To make the 1,000 miles required about 75 gallons of gasoline at a cost of about $8, and about 85 cents worth of lubricating oil. On goods roads the machine can be run at a cost of ½ a cent per mile for fuel; on a poor road it costs twice as much. The repairs so far are directly ascribable to poor roads and streets. The worst or most expensive repair was a damaged wheel which was warped or sprung while crossing one of the deep ditches which are allowed to exist in the city. Aside from the wheel, the repairs have been trifling, replacing a bolt or two, plugging a punctured tire and replacing a weak part of the friction clutch—the latter at the expense of the firm making the machine. The doctor has had only one punctured tire so far; this occurred after making about 750 miles. Recently the machine was overhauled at the factory and some minor adjustments made, the cost of repairs amounting to about $10. The cost in money for running the 1,000 miles, aside from the time required to keep the machine in order, has therefore been about $19.

The only real accident was to run into a woven wire fence in trying to avoid running into a rural mail post near the roadway. No harm resulted to the machine.

The doctor states that he has especially tried to avoid accidents with vehicles drawn by horses. He has not had a single runaway horse, although several times there was imminent danger that such would occur. "Until I had been riding in the machine," he continues, "I had never noticed how extremely careless some persons are and what chances some people take in entrusting their lives to horses. I daily pass horses that stand unhitched, contrary to all laws and ordinances, and one can never know when such a horse will take a notion to run. Frequently buggies are passed with children less than eight years old as drivers, or at times old people so feeble that they could scarcely hold the lines. It makes one nervous to meet such incapables, as they would be wholly unable to hold the horse if it took a notion to run."

Massachusetts Automobile Law.

Following is the text complete of the automobile law which has been in force in the State of Massachusetts for some time. Only the main points of this law were mentioned in THE HORSELESS AGE at the time the law was adopted:

SEC. 1. No automobile or other motor vehicle shall be run on any public highway outside the limits of a city, fire district or thickly settled or business part of a town at a speed exceeding 15 miles an hour, and no such vehicle shall be run on any public way within the limits of a city, fire district, or of any thickly settled or business part of a town at a speed exceeding 10 miles an hour.

SEC. 2. Every person having control or charge of a motor vehicle or automobile shall, whenever upon any public street or way and approaching any vehicle drawn by a horse or horses, or any horse upon which any person is riding, operate, manage and control such motor vehicle or automobile in such a manner as to exercise every reasonable precaution to prevent the frightening of any such horse or horses, and to insure the safey and protection of any person riding or driving the same. And if such horse or horses appear frightened, the person in control of such motor vehicle shall reduce its speed, and if requested by signal or otherwise by the driver of such horse or horses, shall not proceed further toward such animal unless such movement be necessary to avoid accident or injury, or until such animal appears to be under the control of its rider or driver.

SEC. 3. Upon approaching a crossing of intersecting ways, and also in traversing the crossing or intersection, the person in control of a motor vehicle shall run it at a rate of speed less than that above specified, and not greater than is reasonable and proper, having regard to the traffic and the use of the intersecting ways.

SEC. 4. The term "motor vehicle" in this act shall include all vehicles propelled by any power other than muscular power, excepting railroad and railway cars and motor vehicles running only upon rails or tracks.

SEC. 5. Any person violating any provision of this act shall be punished for each offense by a fine not exceeding $200, or by imprisonment for a term not exceeding ten days, or by both such fine and imprisonment.

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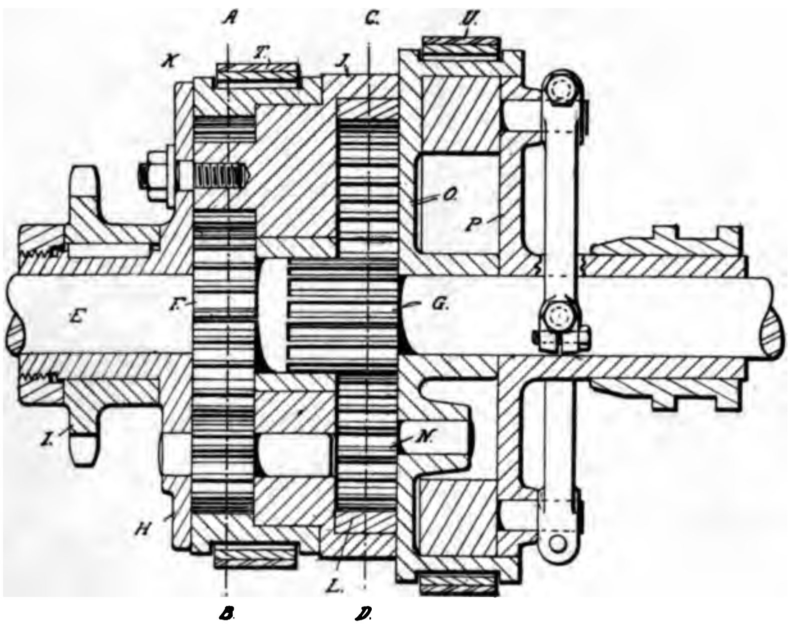

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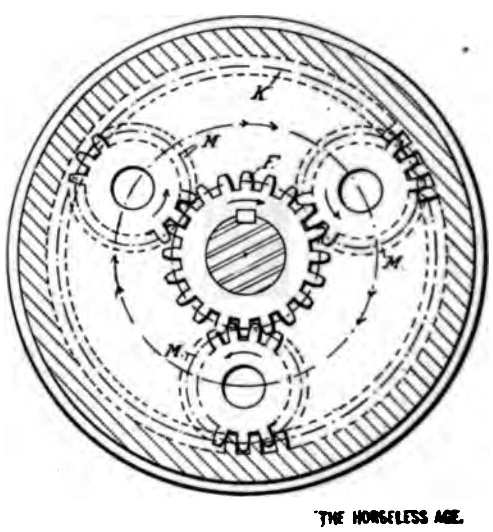
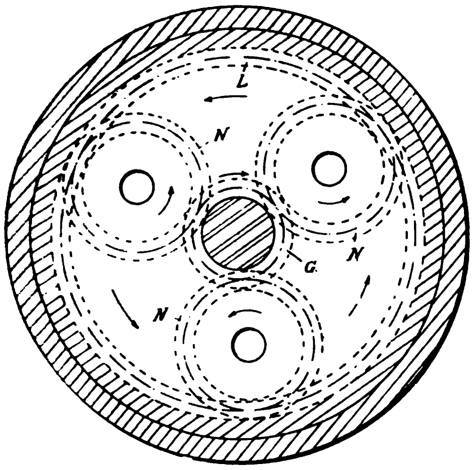


FIG. 2.—SECTION A—B.



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W. E. Pudget was the first man over the line. He made the mile in 6 : 20, or a minute and 10 seconds faster than the right time. E. O. Mack was nearest to the mark. His time was 7 : 40. W. P. Smith went the mile in 6 : 40; C. H. Haskins in 8 : 03, P. N. Gregory in 4 : 06, and Bert L. Jones in 7 : 50.

Mr. Jones then tried to run a mile at what he considered a 12 mile an hour gait. To be exact he should have done it in just 5 minutes. His time was 5 : 29½. Mr. Mack, who followed Mr. Jones, made the mile in 6 minutes.

The last and perhaps the most interesting of all the tests was that in which several owners tried to run a mile in 4 minutes or at the rate of 15 miles an hour. That is the speed which, it is proposed, to allow in the greater part of the city. Without exception the drivers ran slower than 4 minutes. Mr. Pudget was the first man in. His time was 4 : 20. Mr. Granger went in 4 : 23, Mr. Jones in 4 : 25, Mr. Lewis in 4 : 29, Mr. Thurston in 4 : 35. The others were closely bunched.

Those who participated in the tests considered them highly satisfactory. Armed with the results the automobile owners will do what they can to convince the aldermen that what they ask is reasonable in every respect.

One Thousand Miles of Experience.

Dr. Robert Hessler, of Logansport, Ind., recently completed the first thousand miles in his Haynes-Apperson automobile, which he received on May 16 last. An account of the doctor's experience was recently published in a local paper, from which the following facts are taken:

A record is kept of the machine, a daily entry being made of the trips and the number of miles traveled, the amount of oil used, the cost of repairs and in fact any item that has any bearing on the subject. The greatest run on any one day was 65 miles. So far the services of a "hay motor" have not been required to bring the machine back to town, and no time has been lost in waiting.

To make the 1,000 miles required about 75 gallons of gasoline at a cost of about $8, and about 85 cents worth of lubricating oil. On goods roads the machine can be run at a cost of ½ a cent per mile for fuel; on a poor road it costs twice as much. The repairs so far are directly ascribable to poor roads and streets. The worst or most expensive repair was a damaged wheel which was warped or sprung while crossing one of the deep ditches which are allowed to exist in the city. Aside from the wheel, the repairs have been trifling, replacing a bolt or two, plugging a punctured tire and replacing a weak part of the friction clutch—the latter at the expense of the firm making the machine. The doctor has had only one punctured tire so far; this occurred after making about 750 miles. Recently the machine was overhauled at the factory and some minor adjustments made, the cost of repairs amounting to about $10. The cost in money for running the 1,000 miles, aside from the time required to keep the machine in order, has therefore been about $19.

The only real accident was to run into a woven wire fence in trying to avoid running into a rural mail post near the roadway. No harm resulted to the machine.

The doctor states that he has especially tried to avoid accidents with vehicles drawn by horses. He has not had a single runaway horse, although several times there was imminent danger that such would occur. "Until I had been riding in the machine," he continues, "I had never noticed how extremely careless some persons are and what chances some people take in entrusting their lives to horses. I daily pass horses that stand unhitched. contrary to all laws and ordinances, and one can never know when such a horse will take a notion to run. Frequently buggies are passed with children less than eight years old as drivers, or at times old people so feeble that they could scarcely hold the lines. It makes one nervous to meet such incapables, as they would be wholly unable to hold the horse if it took a notion to run."

Massachusetts Automobile Law.

Following is the text complete of the automobile law which has been in force in the State of Massachusetts for some time. Only the main points of this law were mentioned in THE HORSELESS AGE at the time the law was adopted:

SEC. 1. No automobile or other motor vehicle shall be run on any public highway outside the limits of a city, fire district or thickly settled or business part of a town at a speed exceeding 15 miles an hour, and no such vehicle shall be run on any public way within the limits of a city, fire district, or of any thickly settled or business part of a town at a speed exceeding 10 miles an hour.

SEC. 2. Every person having control or charge of a motor vehicle or automobile shall, whenever. upon any public street or way and approaching any vehicle drawn by a horse or horses, or any horse upon which any person is riding, operate, manage and control such motor vehicle or automobile in such a manner as to exercise every reasonable precaution to prevent the frightening of any such horse or horses, and to insure the safey and protection of any person riding or driving the same. And if such horse or horses appear, frightened, the person in control of such motor vehicle shall reduce its speed, and if requested by signal or otherwise by the driver of such horse or horses, shall not proceed further toward such animal unless such movement be necessary to avoid accident or injury, or until such animal appears to be under the control of its rider or driver.

SEC. 3. Upon approaching a crossing of intersecting ways, and also in traversing the crossing or intersection, the person in control of a motor vehicle shall run it at a rate of speed less than that above specified, and not greater than is reasonable and proper, having regard to the traffic and the use of the intersecting ways.

SEC. 4. The term "motor vehicle" in this act shall include all vehicles propelled by any power other than muscular power, excepting railroad and railway cars and motor vehicles running only upon rails or tracks.

SEC. 5. Any person violating any provision of this act shall be punished for each offense by a fine not exceeding $200, or by imprisonment for a term not exceeding ten days, or by both such fine and imprisonment.

...COMMUNICATIONS...

Re the Motor Bicycle Contest.

Editor HORSELESS AGE:

I noticed in your issue of July 16 a letter from Harold Brown with reference to my article in a previous issue, "The Motor Bicycle Endurance Contest." In this letter Mr. Brown informs you of an error I made in saying "all the machines were belt or rope driven." I will say that all the numbered machines I could examine before the start were belt driven or rope driven. I saw several chain driven machines, but they were not numbered at the time and I presumed were onlookers.

I did not say all the carburetors were float feed, but that "atomizing carburetors were used exclusively" (a generator valve is an atomizing carburetor), "and in all cases (I think) the level was maintained by a float."

As to the noise of the exhaust, there were a number of bikes that got beyond hearing before the operators succeeded in getting the motors running. Perhaps the quiet ones were among these. To the best of my knowledge my sense of hearing is not extremely acute; nevertheless I could hear all the machines (whose motors were operating when they passed me) for several hundred feet, and some very much farther.

Mr. Brown thinks that "experience or practice" shows that the electrical apparatus is not of too small capacity, and that my criticism was unfair. I disagree. We will take Mr. Brown's own case in the start of the run in question. I was standing with my camera about 200 feet from the start. When Mr. Brown passed me he was doing what I call work, what an athlete might call exercise and what a motor cycle enthusiast calls "starting the motor." He had to keep on making the wheels go round by vigorous movement of his pedal extremities for a very considerable distance after passing me. I was sorry he had not a better start, as I disliked to see my friend have trouble at the beginning of the chapter. Let us suppose that the average motor cycle will start satisfactorily in 600 feet of pushing. A 28 inch wheel travels about 7 feet at each revolution, or in 600 feet it revolves approximately 85½ times. Now for each revolution of the driving wheel the motor revolves from 6 to 8 times. We will say 7 times, as near enough for our purpose. Every second revolution it has a chance to start, or 3½ chances for each revolution of the driving wheel. Then in 600 feet the motor has 85½ × 3½ chances to mote. Or 299 + times. This should demonstrate that the various parts are too delicate. The small capacity of the cylinder necessitates that the mixture shall be almost exactly right, or else the motor will not go. Being handicapped here, the other necessarily delicate parts, viz., the electrical apparatus (which is not limited by the size of cylinder), should be of ample proportions to help out instead of hinder the delicate gasoline adjustment necessary. Again the high speed of the motor is a serious drain on the batteries and a strain on the coil. These parts and the plugs are of too small capacity.

I had no intention of "making clear" why the idler should be done away with. My article was written to make, or give, others a chance to contradict me, and only two have done so. Too bad! Not only will the idler have to be done away with, but the belt will have to go, too. It is all right to hitch a horse to a buggy by the skin of his ancestors, but leather belts or straps or ropes have no right on a road vehicle. Mr. Brown says: "Nine chain machines started in the run, six of which finished." Are not these figures significant in comparison with the results of the belt driven machines?

Am glad Mr. Brown was no party to the No. 13 episode. I maintain, however, that it was a very childish move on the part of the club. Such organizations should lead public opinion along proper lines, as far as possible, and not follow it. I regret having assumed Mr. Brown to be responsible for the change made.

There is not much in Mr. Culver's letter that needs answering, for "while he talks a good deal he doesn't say anything" (to the point). I am glad he has the power of reading my prejudices, motives and objects, etc, at a distance. He introduces a comparison between automobiles and motor cycles. This, being purely an introduction of his own, does not apply to my article. I have no time to compare them. Am glad he has so charming a muffler and hope he will enter some long run with the same muffler on. My article dealt with the mufflers on machines going on the "Endurance Run." Am also glad he is so pleased with his machine.

I commend to Mr. Culver's attention the Singer motor cycle, made by the Singer Cycle Company, of Coventry, England, as one of a few machines that have had real engineering ability bestowed on them. The ordinary motor cycle looks as if someone who had a bicycle had placed it on one side of the shop and then, placing himself on the other side of the same shop, and amidst a coil, battery, motor, carburetor, etc., had thrown them (à la the knock down baby game at the beaches) at the bicycle, on which they managed to stick. After the throwing was over the various parts were "discovered" and connected up.

Of the many that are working hard on the motor cycle problem someone will bring out a proper machine, but it will be someone who has spent years of hard work, and not one who has quickly assembled an arrangement of parts.

As Mr. Culver has introduced Mr. Damon's articles in his letter it gives me a chance (although a digression from the subject) of expressing my interest in and appreciation of his letters. They are a great aid to all who are conscientiously trying to build or design a sensible automobile. Let us have many more of them and let others come out and tell the truth as well. Too much "varnish" spoils things.

C. C. BRAMWELL.

The Kansas City Endurance Contest.

KANSAS CITY, MO., August 4.

Editor HORSELESS AGE:

As secretary of the Kansas City Automobile Club it affords me pleasure to hand you herewith the official report of the 100 Mile Endurance Race held here on July 18. I am sending this report under the impression that you will be glad to correct the erroneous report published in your last issue, wherein it was stated that Percy P. Pierce, on a Pierce motorette, won a blue ribbon, and that D. F. Piazzek, driving a standard two passenger phaeton, and not a "semi-racer," as stated, was not disqualified, he having made the run in just one minute more than the required time, and having had one stop by reason of a dynamo belt—water soaking into a cemented joint. Mr. Pierce did claim to have won a blue ribbon and to have finished the course

OFFICIAL REPORT, KANSAS CITY ENDURANCE CONTEST.

No.	Contestant.	Operator.	Start.	Fin.	Time.	Award.	Penal. Stops.
1	Haynes Apperson...	D. F. Piazzek.	9:39	4 20	6:41	Red ribbon	1
2	Haynes Apperson...	Frank Nut.	9:41	5:38	7:57	White ribbon.	2
3	Toledo (steam).....	W. T Irwin.	9:35	6:23	8:48	No award	..
4	Foster (steam)......	M. C. Albertson.	9:37	5:33	7:56	No observer's report. No award.	..
5	Pierce Motorette....	Percy Pierce.	9:45	5:55	8:10	Red ribbon.	..
6	De Dion "	C. F. Lovejoy.	9:43	7:16	9:33	No award.	..
7	Pierce "	E. P. Moriarty.	9:53	8:59	11:06	No observer's report No award	.
8	Pierce "	H. W. Luce.	9:45	....	....	Did not cover course.	..
9	Oldsmobile	R. L. Husk.	10:12	8:28	10:06	No award	..
10	Locomobile (steam).	T. W. Day.	9:51	....	....	Did not cover course	..
11	Friedman	Joe Whitman.	9:49	....	....	Did not cover course	..
12	Locomobile (steam).	A. C. Webb.	10:05	6:15	8:10	No observer's report. No award.	..
13	Locomobile " .	L. W. Bursell.	10 30	....	....	No observer's report. No award.	..
14	Foster " .	Ed. Hall	11:04	...	....	Did not cover course.	..

: a stop. A protest was, however, ıat evening and evidence pro and .rd at a regular meeting of our club was decided not to award him a ›bon, it being conclusively demon- by affidavits and oral testimony of six persons that he had at least made ıps, during which time he was seen working on the inside of his ma- So upon motion of D. R. Shively, ; editor of the Kansas City *Star*, it ecided to withhold the award . I take it that you will be inter- ı making the necessary correction, · of the fact that you unwittingly other contestants an injustice. I 'also say that the Foster steam No. 4, driven by Myron C. Albert- ıde the run with but one stop, and ıave received the red ribbon had not ial observer left town without filing ›rt.

MYRON C. ALBERTSON,
Secretary.

Explosive Fire Queries.

'ON-ON-TRENT, England, July 21.
HORSELESS AGE:

'ou answer the following questions rise out of the paper on explosive your "Kerosene Number"?

10 horse power boiler what quan- liquid kerosene would be required ute in an explosive fire?

quantity of air would be required with vapor from the above to form losive mixture?

air were supplied with the kerosene o a closed fire as proposed, i. e., subsequent admission of outside a pressure of say 20 pounds per inch, what horse power would be l to drive the air pump to supply .e?

will see that I want to arrive at · it is practicable to supply *all* the ıired for an explosive mixture by ıumping, which is no doubt much atisfactory than admitting supple- r air to support the combustion.

ARTHUR J. CLAY.

have corresponded with Mr. Lucke rd to these questions, and he states has no data at hand regarding the ınomy of such a fire. We can only ;, then, what fuel economy might onably expected. It is, of course, ood that the type and condition r must affect this quantity more or Vith ordinary automobile boilers ıbe) the consumption of fuel is one-third gallon per horse power, ated horse power of boiler). This ıy corresponds to a consumption -eighteenth gallon for a 10 horse boiler per minute. A somewhat economy would, of course, be ex- with the explosive fire, as no excess is to be heated from atmospheric temperature, as in the ordinary ar- ent, and it is perhaps safe to figure on a consumption of one-twenty-fifth gallon or .26 pound of kerosene.

To burn this amount of kerosene 47 cubic feet of air is required per minute.

To compress 47 cubic feet of air per minute to 20 pounds per square inch pressure requires, with a compressor efficiency of 70 per cent., very nearly 2 horse power.

The principle of the explosive fire, as we understand it, is that the exact amount of air required for combustion is mixed with the fuel by direct pumping and there is no supplementary air supply.

The above allowance for the higher efficiency of the explosive as compared with the ordinary exposed fire is only a rough guess and may be rather far off the mark. Experiments are required to solve this question.—ED.]

A Low Expense Account.

Editor HORSELESS AGE:

I have noted in your paper at times expense accounts by owners of different carriages.

This is my third year of automobiling. My present carriage, which is a low priced gasoline machine, was purchased last December.

While not trying to make a record for cheap operation, would like to give my experience. I run my carriage every day for business, and do not put it into a repair shop every time it stops or something goes wrong, but roll up my sleeves and go at it myself.

Nearly every Sunday, when weather and roads permit, I take a trip into the country. I do not try to see how fast I can run, or how many miles I can cover, but am content with a fair pace, which does not damage the machine.

I find that a machine most always gives warning some time before it absolutely refuses to work. When I am warned in this way I take the earliest opportunity that offers itself to make right the trouble; hence I am seldom stopped on the road and do not have any serious delays or breakdowns.

I make these introductory remarks to show that my machine runs every day, is not nursed all the week for a run on Sunday, and as I do all the repairing myself and have access to all tools necessary you will find no item for work done, but the expense account is the absolute cost for parts and supplies.

I do not want anyone to gather from this that I do not have the ordinary experiences of leaky coils, dirt in gasoline, broken wires, lost bolts, etc., but as I only have to pay the cost of bolts and nuts, or for the stock which is used, this expense is very slight.

In the past eight months I have run the carriage a little more than 2,000 miles over all kinds of roads, both good and bad, and as we are surrounded by hills there is no way out without encountering grades ranging from 10 to 25 per cent., and these hills are from 1 to 3 miles long, which is a good test for a transmission gear.

The expense account has been as follows:

Gasoline	$9.93
Batteries	10.27
Lubricating oil	1.00
New chain	7.50
One new tire	12.00
Express on parts	.80
Bolts, nuts and stock	.50
Total	$42.00

This, you see, amounts to but little over 2 cents a mile, and the repairing takes much less time than caring for one horse.

The express charge on parts was for a small spring used on the steering gear, which the manufacturers replaced without cost.

You will also notice the heavy expense for batteries, part of which is due to my experimenting with batteries guaranteed to give a large ampere output, which, after testing, I found to cost me more than 1 cent a mile.

The new tire was put on because of a heavy cut and not wanting to wait for the old one to be repaired, which, by the way, has since been done, and the tire is now held in reserve.

I do not think this an exceptionally good record, or more than anyone could do who would take care of his own carriage.

W. D. HURLBUT.

A Balky Engine.

NEW YORK, Aug. 3.

Editor HORSELESS AGE:

I am having trouble with a gasoline motor which I have built. It is a 4x4 inch cylinder. I have good compression and the exhaust valve closes correctly. The battery reads 10 amperes at 6 volts and is used in connection with a vibrator coil from which I get a good spark, but not a pure white one. It will ignite the plain liquid, but will not explode the mixture. By putting a light at the muffler exhaust I can fire the mixture after it has passed through the cylinder. By opening the compression cock I can hear the click of the spark at the plug, which is a mica insulated one. The longest time I have had the engine run was about fifteen minutes, after which it began to miss explosions and finally stopped. I have a vaporizer with a 3/4 inch pipe air inlet which I cannot regulate and a 1/4 inch feed pipe, but with a 1-32 hole in the vaporizer. I can regulate the supply of gasoline. What I would like to know is why, if the engine will run well for fifteen minutes, it will not continue until the supply of gasoline is shut off. I would be much obliged if you would help me. The machine work is first class and as far as I know I have done everything to make it work continuously, but am now getting discouraged.

C. F. B.

[It is, of course, impossible for us to tell

what is the cause of your engine refusing to work after a short time of running. The points you make would seem to indicate that the ignition is at fault and it may possibly be that the batteries (if of the "dry" type) grow tired. That you can hear the spark when the relief cock is open is not a sure sign that you get a good spark when the cock is closed, as it requires a much higher voltage to produce a spark when there is compression in the cylinder. In a case in which the symptoms were about the same as in yours it was found that as the coil heated and expanded the primary winding became short circuited and prevented further operation of the engine.—Ed.]

Thoughts Prompted by the Article of W. H. Bertgold.

Brooklyn, August 8.

Editor Horseless Age:

Probably the first thought that enters the mind of most of us on reading the experiences of Dr. Bertgold, as they appeared in the issues of June 18 and 25 of The Horseless Age, is that he certainly merits the congratulations of those of us who, like himself, have also had road experiences. That he has been able to operate a light steam vehicle of the "vintage" of 1900 over 6,000 miles of Colorado roads is conclusive evidence of the truthfulness of his statement that "he has a fair mechanical ability, a moderate knowledge of general physics and a smattering in the use of tools," and proves quite clearly that he "can care for his own carriage."

It has occurred to the writer that it might be of interest and some value to Dr. Bertgold and others if a few cursory views were expressed, based mainly upon the points raised by him in the article in question.

In the first place the question of cylinder lubrication has been troublesome to get around, and the writer is watching with much interest the operation of an automatic lubricator upon a friend's vehicle, which seems so far to give perfect satisfaction. In this connection it would appear that the question of lubrication in general is much simplified by the use of graphite, both within the cylinders and upon any or all bearing surfaces, at least in steam practice. Three ounces of high grade cylinder oil with which is mixed about a teaspoonful of Dixon's "635"—and I want to say here that I believe when any of us users have found what we think is a really good and useful thing we should not hesitate to come out with the maker's name when we attempt to write something that is helpful to the other fellow, be it a packing washer or be it a complete automobile—I repeat, this addition of graphite to the oil will give a mixture that will lubricate the cylinders well for at least 30 miles. Used in this way, even through the unsatisfactory compression cup lubricator, graphite will vastly prolong the life of piston rings and almost indefinitely defer the day when the cylinders need reboring.

As to the fire troubles experienced, the writer is not yet prepared to offer anything, except to confirm the statement that complete closure of the chimney, allowing the exhaust to drag the flue gases down with the exhaust steam will help in the prevention of back firing and blowing out. This procedure will certainly also keep things warm, so that the fire can be relighted after a much longer time than when the chimney cover is not on. No positive denial based upon personal experience can be made to the statement in the advertisements of many of the burner manufacturers, "Our burner is positively not affected by any wind," but there seems ground for belief that the claim cannot be substantiated.

Next in regard to the hose pipe connection between the engine and muffler, through which passes the exhaust steam. If users of these vehicles will try the air brake hose used on the Westinghouse air brake system it will be found that the trouble from bursting of hose will be considerably less frequent. Manufacturers will not put this kind on—it costs money.

Regarding water glasses, the writer has been quite fortunate during his three years' experience and has little ground for complaint on this score, but for the sake of other unfortunates is glad to see that some manufacturers are adopting a glass, the name of which has slipped out of my mind at this writing, but concerning which the highest reports are coming in as to its indestructibility. I noticed that the president of one of the manufacturing concerns had this type of glass upon his private racer at the Staten Island meet, and it is to be hoped he will some day be as thoughtful for his customers' welfare.

Regarding stuffing box packing, the doctor expects no sympathy for his mishap in allowing one of the nuts following the glands of a stuffing box to work loose, as he admits he did not give them proper attention, but he does strike a chord that vibrates with sympathy when he complains of the difficult and unreachable place that the designer locates these important members.

A little pointer in this connection: When desiring to repack your stuffing boxes, do not try to dig out the old packing, but back off all nuts from the four boxes just after coming in, and give the machine steam. The boxes will be found empty in about one second. Just here it is but fair to say that the packing rings that are on the market now are a great improvement over the earlier kinds. The writer is having the best results with a ring packing known as the Garlock.

Three years seems to have brought about little or no advance in the construction of engine bearings—main shaft and crank. Dr. Bertgold's remark that "several times has inspection shown the need ...all cups" could have well been put in more vigorous English. And who can expect that steam engines having ball bearings will not frequently and constantly wear cones and break balls and bearings so long as the engine continues to be hung in a light wooden box and attached to the running gear by a slap whacking chain. We are told at the manufacturer's headquarters that our "engine must have gotten out of line, if balls frequently break and grind out the races." All of which is quite true, but will they show us a steam automobile in which even the angel Gabriel could keep the engine in line if he ran it often? This and numerous other imperfections will disappear—we all know that they are perfectly preventable—so soon as the manufacturer shows some willingness to admit that possibly his first model, fine as it was, can, in the light of later experience, be improved upon.

There are several other points that are well brought out in the article that has been referred to which, so far as they contain suggestions that, if adopted, would make for mutual comfort, and to which we all may heartily say, Amen! But, inasmuch as this article is already becoming lengthy, they will not be taken up in detail at this time. Then, again, the writer is not anxious to get himself disliked or to be looked upon as a chronic fault finder. W. M. Hutchinson, M. D.

Portable Automobile Houses in Demand.

Boston, Mass., August 6.

Editor Horseless Age:

We would like to inquire if you know where we can purchase a portable house for runabout automobile, such as made by a firm in Saginaw, Mich. We think there is one nearer home, in Maine.

The Boston Gear Works.

Fitchburg, Mass., August 5.

Editor Horseless Age:

Can you give me any information in regard to an automobile shed, a portable affair which I saw advertised in your paper some time ago? I want a shed of this kind now, but cannot find the copy in which advertisement appeared, so I address you.

Fred L. Winkley.

The Panhard Single Transverse Spring.

Editor Horseless Age:

On page 126 of The Horseless Age of July 30, 1902, there is comment on the single transverse spring on the front axle of the Panhard racer 202.

I think this important and novel, and your readers, I am sure, will thank you for further information and other illustrations of the idea. Jules Junker.

[The axles and spring arrangement of the new Panhard vehicles are discussed theoretically in the article "Axles and Springs" on page 172 of this issue.—Ed.]

...OUR... FOREIGN EXCHANGES

The Buck Carburetor.

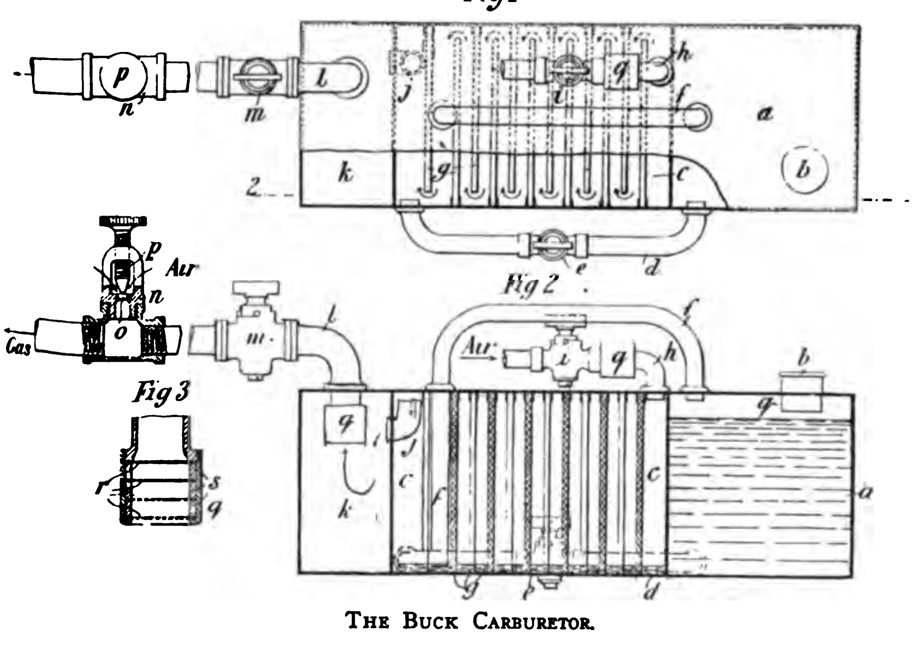
The drawings below illustrate a wick carburetor recently brought out by W. G. Buck, of London.

As may readily be seen, it is primarily formed in two airtight chambers, *a*, Figs. 1 and 2, containing the gasoline, and *c* the carburetting chamber. These two chambers are connected together by a horizontal pipe *d* in both figures set at the side of the apparatus, just clear of the bottom. This pipe *d* is provided with a cock *e* for the purpose of allowing the gasoline to pass from chamber *a* to chamber *c* in any desired quantity. From the under side of the top of the carburetting chamber *c* depend a number of wicks (twelve in the accompanying figures), and which are so set that they leave a space alternately at the opposite sides of the chamber, as shown in Fig. 1. The chambers are also connected by an air tube *f*, which passes from near the bottom of the carburetting chamber *c* to the top of the gasoline chamber *a*, which it enters, as shown above the level of the liquid.

A storage chamber *k* is provided at the left hand of the apparatus, the carburetted air passing thereto by the elbow outlet *j*. Filtering chambers similar to *q*, Fig. 3, are fitted to the filling plug *b*, air inlet pipe *h*, and induction pipe *l*, where shown and marked *q*.

This carburetor acts as follows: It is clear that when the gasoline tank *a* has been charged through the plug *b*, and the air cock in pipe *h* has been opened, gasoline will flow from the pipe *d* when cock *e* is open into the base of the chamber *c*, and will rise therein until its level is above the lower opening of the air tube *f f*. When this lower end of tube *f* is submerged, the flow of gasoline will cease, as then no further quantity of air can obtain access to the space above the gasol.ne in the gasoline tank *a*. The wicks *g g* depending from the roof of the carburetting chamber *c* are of sufficient length to dip well into the gasoline when it has risen above the lower opening of the air tube *f*. These wicks being formed of suitable material, absorb and become saturated with gasoline from bottom to top. The air to be carburetted is drawn into the carburetting chamber through the air inlet pipe *h* by the suction action of the piston taking effect through the induction pipe *l*. The air so induced into the chamber *c* takes a zigzag passage through it, as indicated by the small arrows shown in Fig. 1, and in so doing passes across each side of each of the gasoline saturated wicks *g g*. The effect of this is to thoroughly carburate the air in its passage, which then travels by the elbow outlet *j* into the storage chamber *k*, and thence per filter *q* and pipe *l* to the combustion chamber of the engine. On its way it draws to and mingles with itself any desired amount of pure air through the valve *n*, Fig. 3. As the gasoline passes off from the surface of the carburetting wicks *g g*, and is taken up by the current of air, the level of the fuel lying on the floor of the chamber *c* is lowered, and the open end of the air tube *f* being uncovered, air passes thereby to the space above the gasoline in the tank *a*, and a further and proportionate amount of gasoline flows per the horizontal pipe *d* to the chamber *c* until the lower end of the air tube *f* is again covered, when the flow ceases. When the carburetor is not in use the closing of the cock *e* in pipe *d* confines the gasoline in the chamber *a*, and is therefore perfectly safe. A trial carburetor of this kind has been run for considerable periods in a dusty workshop, and no trouble, we are told, has resulted from the clogging of the wicks by dust, which has proved the weak point of what automobilists speak of familiarly as "flannel carburetors" when used for vehicles running upon the road. The self controlling feed of gasoline from tank to carburetting chamber is similar to that used with the carburetor originally fitted to the Werner bicycle, while the arrangement of the wicks is a great advance upon the crude method first adopted by Vivinus in the cheaply constructed carburetors fitted to his earlier cars.—*Autocar*.

Fig 1



THE BUCK CARBURETOR.

The Ardennes Race.

The race known as the "Circuit des Ardennes," which was run on July 31, was won by Charles Jarrott in a Panhard vehicle. The entire distance was 318 miles, which was covered by him in five hours and fifty-three minutes, averaging 54 miles an hour. Second place was taken by Gabriel (Darracq) and third by W. K. Vanderbilt (Mors). The latter's time was six hours twenty-two minutes. Fournier was prevented from competing by a sudden illness. The route was well chosen, leading through only three small villages. No stop was allowed, however, since the circuit was too short—only about 50 miles in length, and six times around were required to make the 318 miles. The leaders could not attain their highest possible speed, and were frequently held back by being unable to pass some competitor on account of the narrowness of the road. There were several bad accidents, but no cases of "telescoping."

New World's Records.

According to a cable from abroad W. K. Vanderbilt, Jr., broke the flying start mile and kilometre records on the highway between Ablis and St. Arnault, France, on August 5. He made a mile in 48 2-5 seconds and the kilometre in 29 2-5 seconds. The times were taken by official timekeepers of the A. C. F. Fournier's mile record (51 1-5) and Serpollet's kilometre record (29 4-5) have been eclipsed. Mr. Vanderbilt drove a Mors racer of the Paris-Vienna type.

A very good comparison as to the speed attained by the automobile in the Vienna-Paris race and railway speeds is offered by the last section, namely, that of Salzburg to Vienna. The fastest train on this line, one of the speediest the continent has, is the Orient Express. From Salzburg to Vienna, it takes five hours and three minutes, and allowing for twelve minutes for the five stoppages en route, as shown by the official time tables, the actual time occupied is four hours and fifty-one minutes. Marcel Renault, the fastest of the automobilists on this section, covered the distance, allowing for neutralizations, in four hours and eight minutes, therefore in forty-three minutes less than the train.

Experiences in Obtaining an Official Permit to Drive a Motor Vehicle in France.

A member supplies the following account of his experiences in going through the formalities necessary to be able to drive a motor vehicle in France: "I was driving a racing car, and set about to get my certificate, in accordance with the instructions contained in Notes and Notices of February 13. I wrote on June 13 to the prefect of police, enclosing two copies of my photograph and, as my identification paper, a passport and a reproduction of a photograph of myself, together with particulars of my career which appeared in an English paper.

'On arriving in France on June 21 I found there was no reply awaiting me at my hotel. I therefore sent a French clerk to the prefect of police, who referred him to the engineer of mines, M. Herscher, 29 Rue Guyot. M. Herscher most kindly arranged to receive me on Tuesday, June 24, and accordingly on that day I drove to his office on the racing car. * * *

"Having arrived at M. Herscher's office, I was received by him, and he deputed one of his assistants to examine me in driving. He took his place on the mechanic's seat, and as I was under the impression that the examination was made with a view of ascertaining whether I could drive, I proceeded to drive him through the streets of Paris on the second speed, about 25 miles an hour. This appeared to knock the fear of sudden death into him, and he insisted upon my going slowly. He made me apply the brakes and put in the reverse, and at the end of five minutes the examination was over. I left the car in the street, and climbed with him up to M. Herscher's office. Here the particulars of the car were filled in on a certificate; I was asked to give the speeds in kilometres of the respective gears of the car. (I am advised that it is as well to speak the truth, as in the event of it being proved afterward in a race that one has understated the speeds, the certificate may be cancelled. Naturally before submitting the car for examination it is advisable that the brakes should be in very good order.) When the form had been filled up I was informed that the matter could not be proceeded with further, as the application for the permit, made by me to the prefect of police on June 13, had not been received at the office of the engineer of mines. I was about to retire, in order to wake up the police office, when a clerk ran after me and said that after all they had found that my application had been forwarded. I was then given the provisional "permit de conduire,' which is simply a permission to drive a petrol vehicle, and is available for about one month. I was also given a certificate for the racing car, added to which was a note that after the race the carriage must be presented, in order that there may be attached to it a seal which would prevent any but the first and second speeds being used. I was told to take this certificate to M. Walckenaër, at 218 Boulevard Saint Germain, who is apparently the 'ingénieur en chef des mines.'

"The Boulevard Saint Germain is at the other end of Paris, and is reached by crossing the Seine at the bottom of the Place de la Concorde. On arriving there I was told that M. Walckenaër would not be at his office until 5 o'clock in the afternoon. I therefore left the certificate for his signature. On going again to M. Walckenaër's office the following letter was handed to me: 'I beg to return to you herewith the papers, and to inform you that these are not sufficient to allow cars to be run, in accordance with the conditions of the *décret* of March 10, 1899. You must obtain for each car a "récépissé de déclaration." If you will call again at my office between 4:30 to 5 p. m., I will give you all necessary information in the matter."

"On calling again at 5:30 I was told to ascend the stairs to the fourth floor, and there found M. Walckenaër surrounded by clerks. He was extremely courteous and instructed a clerk to make out the necessary 'récépissé de déclaration,' and he then left the room. It is necessary for the clerk to fill in on the printed card five particulars, in all twenty-one words. Before doing this, however, the clerk entered into a lengthy discussion with one of his colleagues on affairs which were in the first place official, then became unofficial, and finally were of a personal and private character. Having waited patiently for some twenty minutes I said to the clerk that perhaps I might assist him in filling in the particulars on the card if he would sit down and dictate them to me, and that I was extremely loath to interfere in his conversation or the enjoyment of his cigarette. He became very excited, and replied by telling me that it was necessary to wait, that all would be done in good time, but I must not get flurried, and emphatically I must not attempt to hurry him or his colleagues. After a short time M. Walckenaër returned and inquired whether the card had been made out. The clerk assured him it was in progress of being made out, and finally, after some three-quarters of an hour's delay, I obtained possession of the card. I am told that it will now be necessary for me to apply to the prefect of police for the permanent permission to drive.

"If the French authorities had wished to design formalities with the special purpose of preventing foreign automobilists from coming to their country, nothing more effective than the present absurd form, through which the unfortunate automobilist has to go, before he is free to drive an automobile in France, could have been devised."—*A. C. G. B. and I. Club Notes and Notices.*

A trial of delivery wagons is to be held by the A. C. G. B. and I. next year.

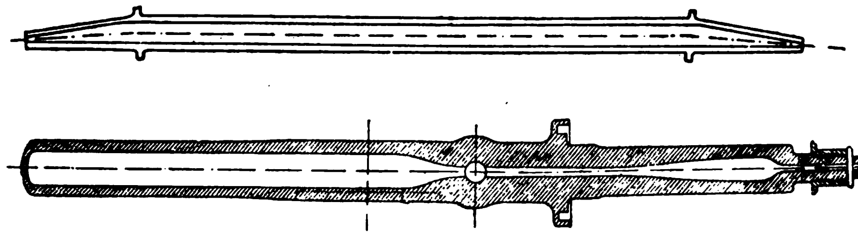
Axles and Springs.

How many grades of steel have been tried for axles before one was found which was capable of withstanding with safety the shocks of the road? Only the wagon builders can give an adequate idea of the difficulties of the problem. Are not vehicles of all kinds seen daily on the streets of the capital with broken axles? With amazement some wagon builders have looked upon certain automobile axles, which, although constructed of brazed tubes and assembled by means of bolts, stood up well when carrying loads at the middle of their length which might have been expected to cause a complete fracture at the end of a few miles, owing to their inertia. Those who know never expected such an accident, being aware of the protective effect of the pneumatic tires.

In spite of the security offered by elastic tires the traditional soft iron axle, rather heavy, but so dear to those who have had occasion to appreciate its safety, only gives way slowly before the progress of metallurgy and the new requirements.

Artillery practice, from which automobile designers have already adopted their designs for wheels, has now brought forth a new hollow axle which seems to give complete satisfaction from the standpoint of lightness, and offers at the same time great resistance to deterioration by the recoil of the cannon or at least by the weight of the latter, which it carries without the intermediary of springs on wheels shod with steel tires jolted at full speed over hill and dale by the combined effort of six horses. It is therefore of interest to describe the method of manufacture of these axles, the more so as the well known automobile manufacturers who won in the alcohol race have applied to their vehicles axles manufactured by this process, improved upon by their axle manufacturer.

To begin with, bars are taken of steel of medium hardness with a tensional strength of 70,000 to 85,000 pounds per square inch and 20 or 25 per cent. elongation before rupture. This bar, which is of a diameter equal to that of the largest part of the finished axle, is roughed out on the lathe. Then it is drilled to the largest diameter of the opening for the entire length, Fig. 1. Next the bar is raised to red heat, hardened and tempered, an operation which has the effect of hardening the material by closing the pores, to render the molecular state thereof homogeneous and to extend the limits of elasticity in notable proportions. Then the spindles are forged out cone shaped, which reduces the diameter of the bore toward the end. The hammering, moreover, hardens the spindle, which reduces the friction in the hub. The blacksmith gives the spindles the desired inclination, which serves the object of forcing the hub against the base of the spindle. The inclination is particularly large in these axles, that of the axles used by the artillery being 7 per cent. To avoid any undue



FIGS. 1 AND 2.

friction from this source the conical conformation of the spindle and the inclination of the latter are made to compensate for each other, and the line of contact of the spindle with the hub is horizontal.

Finally, the axle is finished on the lathe.

Automobile axles have only an insignificant inclination of spindles, 3 per cent. at most, to permit proper operation of the chains. There is therefore no reason to taper the spindles, as other more rational means permit to lighten the spindles as much as it is theoretically possible, by removing every unnecessary particle of material. In fact, this lightness, so much to be desired on condition that it does not impair the strength, is secured by the manufacturers of automobile axles by an absolutely rational distribution of the material on the one hand and the highest grade of material on the other. In their hollow axle the material is systematically removed as far as possible from the neutral fibre, while the longitudinal section corresponds closely to the theoretical form of a solid of equal resistance to bending, as shown in Fig. 2, which represents an axle the exterior of which is turned down cylindrically and the interior of which is hollowed out to a greater or smaller diameter, so as to give every point along the length exactly the strength required.

To manufacture such axles one begins by forging the bar and turning it on the outside with enlargements at certain points equivalent to the reinforcements it is desired to obtain on the interior, at the expense of the bore, which has as yet not been made. The bar thus shaped, a straight hole is drilled through it from end to end equal in diameter to the largest opening desired at any place. The axle is then heated and pressed in dies, which removes the enlargements from the outside and causes a contraction of the bore at these places. Next the straight bar is given the desired curve of the axle. After being hardened the axle is tempered, the spindles are given the required inclination, are hammered and are finally finished in the lathe.

The metal employed is nickel steel. Nickel introduced into the steel during the process of manufacture improves its qualities of elongation, elasticity and tensile strength. Thus the highest qualities of nickel steel, containing a proportion of nickel of 8 to 12 per cent., have a tensile strength up to 240,000 pounds per square inch. Eight to 12 per cent. of nickel is the proportion which gives the greatest tensile strength.

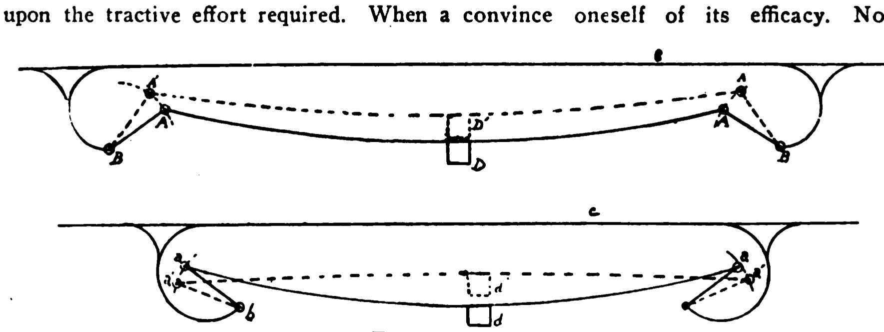
The question of spring suspension for the vehicle frame is as worthy of interest as that of the wheels or of the axles. In fact, if the wheels have struck the road under the influence of the speed and weight of the vehicle, as a hammer strikes an anvil, the springs between the axles and frame take up the shock. An unavoidable law of mechanics edicts that action and reaction are always equal; therefore, the better the dead weight carried by the springs is suspended, the better the axles and wheels are protected. In fact the shocks to which wheels and axles are subjected are exactly the same as those experienced by the passengers carried by the vehicle plus the shocks due to the weight of the wheels and axles themselves.

The suspension also has an influence upon the tractive effort required. When a wheel passes over an obstacle it is displaced vertically a distance equal to the height of the obstacle, while the frame, on the position of which the centre of gravity of the vehicle depends, is displaced only a distance equal to the difference between the height of the obstacle and the flexure of the springs. Now, it is evident that the less the centre of gravity is displaced vertically, the less energy is consumed in this useless motion.

The position of the links connecting the frame with the springs is of the utmost importance from the standpoint of efficient suspension. But this question is generally solved in a manner exactly the opposite to that which is rational. In fact, according to the usual mistakes, the ends of the springs A A are connected to the spring brackets B by inclined links exerting a tension effect on the main leaf of the spring (Fig. 3). Now, when the wheel passes over an obstacle the axle D rises to the position indicated by D'. The curved spring extends while it is being straightened, and the link, turning around B, rises to A'. It will thus be observed that the end of the spring rises with regard to the frame at the same time the axle rises, while in the case of Fig. 4, where the links are applied rationally—that is to say, the point *b* interior to the point *a* and the link exerting a compression effect on the main spring leaf—the elongation of the spring due to its flexion results in lowering the point *a* to *a'*. Since the load is lowered while the axle rises, the mechanical power wasted in jolting, far from being increased, as in the first case, is actually decreased in proportion to the reduction in the vertical distance traversed by the load.

The reduction of a shock caused by passing over an obstacle is also dependent upon the position of the pivot point on the bracket. In fact, in Fig. 3 it will be observed that when the axle rises the point A approaches the frame, or inversely the frame approaches the point A, i. e., the axle. Thus the "anvil' approaches the "hammer," which cannot be said to have the effect of relieving the shock.

In Fig. 4, on the other hand, *a* recedes from the frame, which thus flees from the axle. The shock is thus attenuated by the same process by which a boxer attenuates a blow, by withdrawing his chest at the approach of the fist. The results obtained by the process are such that a trial suffices to convince oneself of its efficacy. Now, the action being equal to the reaction, the axles, wheels and the expensive tires are saved very much, which is certainly not the least important side of this question.



FIGS. 3 AND 4.

The same as a good suspension, the stability is a factor in the economy of traction. The less stable a vehicle the less power it absorbs. In fact, obstacles are not generally struck by both wheels at the same time; soon one wheel is raised and soon the other. Now the less stable the vehicle is the less effort is required to raise one wheel. It is well known how easily a heavy load is moved by being rocked. It is the same with a vehicle which is given a rocking motion by the unevenness of the road, soon on one side and soon on the other, and it is easily understood that it offers more resistance to traction the greater the difficulty with which it surmounts the succession of obstacles constituting a road. In relation to this matter I have from Mr. Jeantaud, the well known manufacturer, the following anecdote:

Being intrusted by the Compagnie l'Urbaine with designing a type of cab for use in Paris, he had to make a large number of comparisons between all public vehicles in existence in France and elsewhere,

to determine the best type. The results were obtained by means of registering devices, and it was a miserable London cab which he found to have the lowest traction coefficient. It was heavier than all the rest, had smaller wheels and a shorter wheel base, conditions notoriously unfavorable to a low traction coefficient, and yet this vehicle ran easier than any!

To solve the mystery which it seemed to hide the vehicle was demolished, but nothing unusual was found, except that the roof, which was designed to carry baggage, was abnormally heavy. The cab was then reconstructed to be tried once more on the road, but the roof was reduced in weight. Put back in service the cab had completely lost its superiority.

The lightening of the roof had lowered the centre of gravity and rendered the cab more stable, and the traction coefficient had increased in proportion!

This certainly does not mean that automobiles should be built to be unstable, and to sacrifice to mechanical efficiency the most precious quality of a vehicle—the safety thereof. However, the suspension may be designed to permit the wheels to rise with the greatest facility without affecting in the least the stability of the frame.

The system of suspension generally employed comprises four springs, which energetically force each of the wheels against the road surface, not only by their individual pressure, but also by the reaction opposed by them as a whole against the torsion of the frame as soon as the effect of passing over an obstacle tends to raise one corner of the frame. Is it not more logical to provide both axles with entire freedom of motion with respect to each other, a result that can be secured by arranging on the front axle a single transverse spring, pivoted at the middle to the frame so as to allow the axles to swing independently in vertical planes without any reaction between them? Further, it will be seen that a wheel in passing over an obstacle hardly displaces the centre of gravity of the vehicle around which it oscillates in one sense. The displacement of the centre of gravity is further reduced by the lengthening of the wheel base. Finally, there is a gain in lightness and cost, corresponding to the weight and cost of one spring and the two brackets. From the standpoint of stability, the possible oscillation of the body frame relative to the front axle being limited by stops, the same security may be obtained as with the ordinary system of spring suspension.

There is, however, another point to be considered in this connection—the greater freedom of oscillation of the body frame around its longitudinal axis under the effect of the crank reaction of the motor, it being understood that the axis of the crank coincides nearly with the axis of the frame. This effect depends upon the regularity of running of the motor, the quantity of energy stored in the flywheel and the number of cylinders.—*F. Gaillardet in La France Automobile.*

Official Cl ssification in the Paris-Vienna Race.

No.	Driver.	Manufacturer.	H. P.	Weight of Vehicle.	Total Distance 615.5 Miles. (Switzerland Deducted.)			
				Kilog'ms.	H.	M.	S.	F.
1	M. Renault	Renault Frères	16	646	15	47	43	4
2	H Farman	Panhard-Levassor	70	693	16	..	30	1
3	Edmond	Darracq	24	630	16	10	16	1
4	Zborowski	Mercédes	40	978	16	13	29	3
5	M Farman	Panhard-Levassor	70	986	16	19	29	2
6	A. L. Baras	Darracq	24	630	17	4	52	..
7	Teste	Panhard-Levassor	70	994	17	13	28	4
8	Hemery	Darracq	24	640	17	23	38	3
9	A. Marcellin		24	649	17	38	36	1
10	Pinson	Panhard-Levassor	70	994	18	..	41	2
11	P. de Crawhez		40	995	18	5	20	2
12	Chauchard		40	993	18	16	45	2
13	Tart	Clément	20	632	18	26	45	3
14	Berteaux	Panhard-Levassor	24	642	18	28	..	3
15	Edge	Napier	60	933	19	16	21	4
16	A Collins	Darracq	24	638	19	16	47	3
17	Barbaroux	Clément	20	638	19	51	1	..
18	De Caters	Mors	60	1007	19	54	58	1
19	Guillaume	Darracq	12	398	20	4	33	..
20	J de Crawhez (A. L.)	Panhard-Levassor	40	995	20	6	36	2
21	Dechamps	Déchamps	20	649	20	16	25	3
22	Grus	Renault Frères	8	398	20	17	54	2
23	Jarott	Panhard-Levassor	70	982	20	44	12	..
24	Dernier	Gobron-Nagant	18	632	20	45	57	1
25	Leys	Panhard Levassor	70	985	20	51	52	3
26	Augières	Mors	40	998	21	17	50	4
27	Weigel	Clément	20	623	21	28	37	1
28	L. Renault	Renault Frères	16	634	21	50	19	2
29	A. L. Rigolly	Gobron-Brillié	18	635	22	8	38	4
30	Sabis-Bey	Panhard-Levassor	40	996	22	9	52	1
31	Uhlmann	Decauville	18	641	22	20	39	1
32	A. L Chanliaud	Gardner-Serpollet	12	959	22	27	38	1
33	A Fournier	Gobron-Brillié	18	643	22	55	48	2
34	Mestayer	Decauville	18	637	23	8	39	4
35	Leger	Georges Richard	16	641	23	9	45	..
36	Cormier	Renault Frères	8	400	23	22	37	2
37	Pirmez	Delahaye	16	610	23	42	17	..
38	Conrard	Gobron-Nagant	18	626	23	57	18	1
39	Stephen-Ribes	Panhard-Levassor	24	645	24	7	22	1
40	Gavaris		24	876	24	19	31	1
41	A. L. Leblond	Gardner-Serpollet	12	970	24	20	20	..
42	Merville	De Dietrich	16	862	24	20	53	3
43	Kœchlin	Gobron-Brillié	18	643	24	63	54	..
44	Rouquette	Peugeot	16	650	24	53	43	2
45	A. L Osmont	De Dion-Bouton	7	210	25	1	18	4
46	Stead	Georges Richard	16	638	25	32	56	4
47	Perrin	Delahaye	16	637	25	35	29	4
48	Durand	Corre	8	397	25	47	13	2
49	G Rivierre	Georges Richard	10	396	26	7	23	1
50	Loraine Barrow	De Dietrich	15	650	26	12	23	..
51	Cozic	Déchamps	20	647	26	17	36	3
52	Bucquet	Werner	2	45	26	37	2	3
53	Kircheim	Fahrzeugfab. Eisenach	15	630	27	13	55	4
54	Comiot	Clément	20	628	27	15	42	2
55	Berrue	Gobron-Brillié	18	646	27	30	17	3
56	Rutishauser	Gardner-Serpollet	12	978	27	44	51	3
57	Paul Riviere	Déchamps	20	650	28	16	35	3
58	Labitte	Werner	2	46	28	26	36	1
59	Guders	Panhard-Levassor	24	644	28	46	43	2
60	Olliver	Gardner-Serpollet	12	906	28	47	48	..
61	Lamy	Renault Frères	8	397	30	11	48	4
62	De la Touloubre	Decauville	18	643	30	28	36	1
63	G Richard	Georges Richard	10	397	30	55	6	4
64	Marot	Decauville	18	643	31	27	7	2
65	Buchillet	Corre	8	400	32	16	20	1
66	Rieger	Laurin-Clément	3	50	33	48	12	3
67	Posednick		3	50	34	28	45	4
68	Cornilleau	Decauville	18	643	35	1	32	3
69	Page		18	649	35	26	12	4
70	Holley	De Dion-Bouton	7	230	35	29	17	1
71	Volatum	Clément	20	633	36	58	15	1
72	Thery	Decauville	18	642	37	12	22	2
73	Passy	Passy-Thellier	8	396	44	55	16	4
74	Gasté	Automotrice	12	567	45	17	4	..
75	J. Salleron	Georges Richard	16	648	45	41	8	3
76	Legrand	Crouan	12	644	46	3	55	3
77	Simon	Sté Téléph Ader	15	607	46	21	35	1
78	Dupont	Libéria	12	529	47	10	42	2
79	Cottard	Gardner-Serpollet	12	987	47	52	31	3
80	Tenearts	Déchamps	20	650	68	31	53	..

onditions of the Arrivals in the Paris-Vienna Race

wing are some observations on the on of the racing machines in the ienna race after arriving in Vienna, om the *Engineer:*

ne of the Panhards the back was ely broken away, and in another ap had been fastened on with wire, bonnet had become detached from ges. The Panhard driven by Mr. lost the muffler, and had a hole l in the gear box. There was, r, no trouble with the new Cen-otor, and except in the case of the Bennett cup vehicle there is no in-of gears in these cars breaking. A -Brillié vehicle presented the ap-e of a wreck, with the bonnet bat-d the tool box, spokes, and steer-el broken, while some of the spiral between the leaf springs and the were missing. The Napier had a tool box and the bonnet had suf-ut otherwise it was in good condi-d a Mors had evidently come into i, but the pneumatic buffers in hicles between the axles and the were intact. Except in the case of amps, where the back of the ve-s down on the axle, none of the in the vehicles arriving at Vienna ken, and this is the more remark-they are all made extremely light; s difficult to say whether the effi-of the springs has been improved way by the practice of interposing blocks between the spring and the or pneumatic buffers, rubber or springs between the leaf springs e frame. As we have seen, it spiral springs were a failure ough roads, but the fixing of rub-the top of the leaf springs un-ly served to protect them from the of the frame on the axles, and a certain extent probably, to save ne from excessive shock, which on is obviously very necessary in vehicles, where the engine is bolt-the side members. Singularly the Renault, Clément and other riages had rubber blocks between springs and the axles, but though ngs were perfectly sound there hing to show that they would not me equally well out of the trial them. This combination of rub-i springs is hardly likely to be-recognized feature in automobile tion, and at the best can only be l as a device to compensate for the rings in racing vehicles, but nev-i the Mors pneumatic check is a and useful invention, and the s shown that even tourists may springs of their vehicles by fixing of pneumatic tire between the and the frame. The tubular under n the Decauville and some other light carriages were intact, de-amount of brazing, which might have been expected to develop signs of weakness in such a trial. On the whole, though all the vehicles finishing at Vienna had more or less suffered, the damage could have been easily repaired at small cost, but there was naturally no means of ascertaining the damage to the scores of vehicles which lay strewn along the course, most of them smashed up in collision with trees and other obstacles.

One of the most satisfactory things about the race was the behavior of the pneumatic tires. In previous contests competitors have always been able to change their tires at the end of each run, and each set was never used for more than 200 or 300 miles, but in the Paris-Vienna race the new regulations were enforced, whereby nothing could be done to the vehicles from the time they were put up at the garage on terminating the day's race to the moment of leaving it the following morning, and all tire and other repairs, as well as the filling of the tanks, had to be counted in the racing time. Competitors had, therefore, every advantage in using the tires until they punctured or were worn out, and it was expected that this would prove a very serious factor in the fortunes of the race. It is true that as the vehicles had to stop at nearly all the towns along the route opportunities were given of cooling the tires, and thus, in a certain measure, minimizing the destructive effects of high temperature, not only in deteriorating the rubber but also in bursting the tires. The test was nevertheless an exceptionally severe one, and it says much for the progress that has been made in the manufacture of pneumatic tires that so many of them should have gone through the race without giving the slightest trouble. On arriving in Vienna many of them were badly cut, and others had the rubber completely worn away from the tread, leaving the fabric bare. All the competitors, in fact, spoke highly of the behavior of the tires, and it is safe to say that during the past few years their life has been increased twofold.

Among the prizes offered at the Coronation bazaar recently held in London, in aid of the Ormonde Street Children's Hospital, was a Daimler automobile.

The county council of Surrey—the centre of motorphobia in England—has authorized the purchase of an automobile for use of the county surveyor. It is not to exceed $1,250 in cost.

At a complimentary lunch to S. F. Edge, given at the Hotel Cecil on July 22, the winner of the Gordon Bennett cup said there was certain to be a big demand in England for springs, axles, lubricators, wheels and tires, but, unfortunately, they were still lacking manufacturers who were ready to lay down expensive plant for the production of some of these parts, and frequently there was a want of adaptability.

A telegram from Vienna states that a German automobilist met death and his companion was severely injured by being struck by lightning while driving at a high speed.

The speed trials which the A. C. G. B. B. and I. intended to hold at Bexhill this month, and which were made the subject of an injunction, were held at Welbeck on August 7 on a private track.

The French Minister of War has issued a lengthy army order, giving detailed instructions as to when, under what circumstances and the kind of automobiles which may be used by inspecting generals for army purposes.

The committee of the A. C. G. B. and I. have decided to offer a prize of 10 guineas for the best design suitable for use either as a club badge or as a club medal. Designs must be in the hands of the secretary not later than October 1.

The Ras Makonnen, an Abyssinian chief at present in Paris, has been much impressed with the comforts of automobile travel. While at first he declined an invitation to a ride, of late he has been visiting a number of automobile factories and visiting public buildings in automobiles.

Madrid, Spain, has fixed the speed limit for automobiles within the city boundaries at 8 kilometres per hour. Permits for driving must be obtained for all vehicles. A distinctive number must be carried in front and at the back. Certificates for drivers are granted by the inspecting engineer of carriages.

The Sanitary Institute is organizing a "health exposition," to be held in Manchester from September 9 to 27, and has decided to offer a special medal for motor vehicles adapted to the following municipal purposes: Water carts, road sweeping machines, slop and scavenging carts, dust carts, ambulances, disinfecting vans and fire engines.

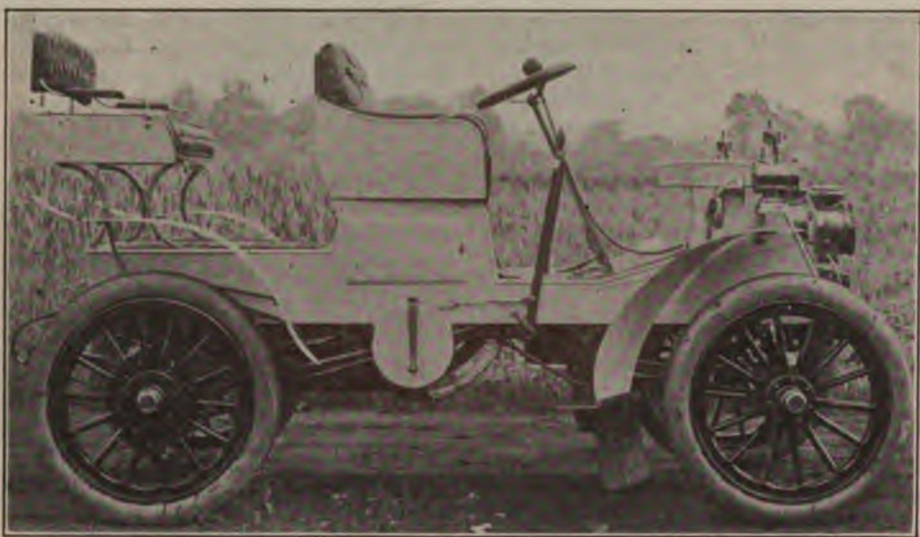
An automobile driver who was charged in an English court recently with furious driving, was more candid than complimentary in his opinion of motor bicycles. Part of the evidence against him was that he had overtaken a motor bicycle. "Yes," he replied, "but those go any way. You can generally walk past them." He was discharged.

Among the patents connected with gasoline automobiles recently taken out in Great Britain is one for an improved form of carburetor in which the essential feature is a revolving brush. This derives its motion from somewhat convenient source; in revolving the bristles come in contact with a baffle, causing the gasoline to be broken up into spray.

NEW VEHICLES AND PARTS.

A New Packard Design.

The photo herewith illustrates the touring car which Mr. Packard, president of the Ohio Automobile Company, has designed for himself. It is substantially their 12 horse power Model F, but with an arrangement of seats after the style at present becoming popular in France. The rear seat is said to be very comfortable, and on account of its construction saves much unnecessary weight and is just as strong as though resting on built up woodwork.



J. W. PACKARD'S SPECIAL TOURING CAR.

The peculiar design of this vehicle lends itself particularly to the requirements of touring, for a strong brass finished railing takes the place of the easily detached rear seat, and a large amount of baggage can then be safely carried on the flat rear end.

In addition to the oil side lamps, this machine is equipped with two acetylene headlights, as Mr. Packard is an enthusiastic night driver. The wheel base is long (84 inches), and with large wheels and tires well fits the machine for rough roads.

A new departure in this vehicle is the adoption, after a long series of tests, of 2 inch hollow steel axles, running on bearings consisting of 7/8 inch steel balls. Each axle has a 1 inch hole running through its entire length.

The hub brakes are of new design, double acting and very powerful, capable of locking the rear wheels when the carriage is at speed. There is, in addition, a very effective single acting brake on the end of the transmission shaft, operated by throwing the clutch lever forward.

The transmission is the same as on the Model F, giving three speeds ahead with but two gears in mesh at any time, and a reverse. The method for shifting the gears is the well known Packard design which makes it possible to shift from the high speed to the reverse or any other gear without passing through the intervening speeds.

Eight of the principal bearings are oiled automatically by a pump which, being operated by the engine, always feeds in proportion to the engine speed and stops with the engine. The gears are contained in an aluminum case and run in a bath of heavy oil.

Jump spark ignition is used, with the timing of the spark under the control of a centrifugal governor. This causes the ignition to occur earlier with each increase in engine speed, and accounts for the great rapidity with which the engine will vary from minimum to its maximum speed (850 revolutions per minute).

The carburetor is of the float feed pulverizing type and one set gives a uniform mixture for all variations of engine speed. The fenders are of aluminum, painted and striped to match the body.

The steering is by worm and segment, with a special cushioning device for relieving the worm of the shocks produced on the wheels by bad roads.

The forward seat might, in the estimation of some, be changed to advantage to individual seats, but the arrangement adopted is preferred by Mr. Packard on account of its roominess.

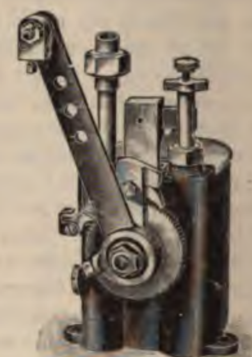
Kerosene Burners on Toledo Carriages.

The International Motor Car Company inform us that they are now prepared to accept orders for "Toledo" steam carriages fitted with kerosene burners. This secures them the advantages inherent to kerosene as a fuel, viz., greater safety from fire and reduced operating expenses. The "Toledo" steam carriages fitted with the new kerosene burners are said to travel 100 miles on 9 gallons of fuel. The required air pressure is much less than when gasoline is used for fuel, 30 pounds pressure being ample for perfect combustion. Noise and smoke are said to have been entirely overcome by a suitable construction of the vaporizing apparatus. The kerosene burners will be fitted at no additional cost to the purchaser.

The "Improved Pony" Lubricator.

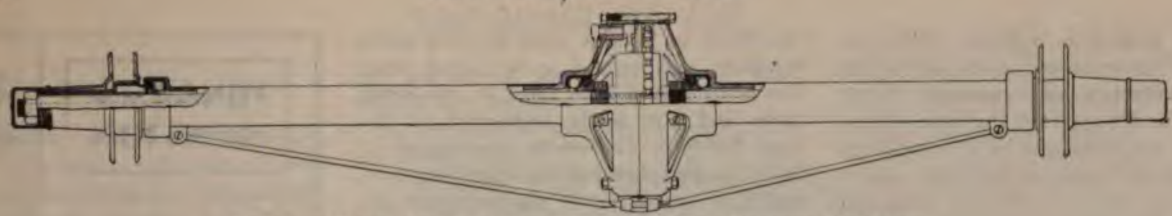
Greene, Tweed & Co., 17 Murray street, New York, have developed a new automatic lubricator of the Rochester type, which they have named the "Improved Pony." The former type was very much heavier than the new model and did not permit of such accurate adjustment.

The engraving illustrates the latter, which has an oil reservoir holding a little over ½ pint and weighs 4½ pounds. It is claimed that the lubricator will supply the cylinders of a steam carriage with oil for a run of 100 miles. If superheated steam is generated by the boiler the mileage per filling will be somewhat less. In the original pattern the only adjustment that could be made was that of the angular movement of the main operating arm, which was accomplished by shifting the position of the pin that secured the driving link to the arm of the apparatus. This feature has been retained in the improved model, and the following means of adjustment have been added.



A set screw is screwed into the plunger so that its lower end extends into an oblong opening into which a finger projects. This finger is attached to a member which is actuated by a cam and, therefore, has a constant stroke. If the set screw is screwed way down the plunger makes the full stroke, but if the former is screwed back, so that there is play between it and the finger, the plunger makes but a fraction of the full stroke. A small wing jam nut secures the set screw once it is properly adjusted. To set the time of feed, with or without varying the angular motion of the ratchet wheel, it is only necessary to loosen the set screw in the hub of the driving lever and shift the latter or the arm that holds the pawl, or both, relatively to the cam, and then tighten up the set screw which fits into a groove turned into the hub of the arm mentioned.

This lubricator is intended to force the lubricant into the steam supply pipe of a steam engine or to feed oil directly to the piston of a gasoline motor at a given time



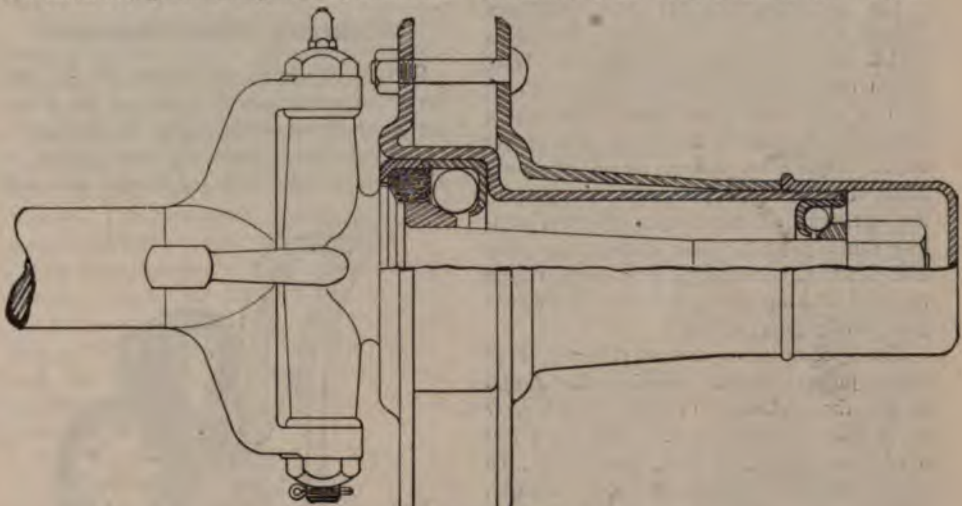
TUBULAR REAR AXLE OF THE AMERICAN BALL BEARING COMPANY.

n measured quantities. It does not when the engine is not running, and es no attention other than filling the oir when starting out.

rican Ball Bearing Company's Automobile Axles.

accompanying cuts show the latest ctions of the American Ball Bearing any in the way of steering axles, ar rear axles and hubs. The hubs rawn from sheet steel by powerful ulic presses, thus making them very and giving smooth surfaces for fin-g. One row of large balls directly r the spokes carries the load, while uter row merely maintains the align- of the wheel. This is a great advan- on the front wheels, as it brings the e of the wheel very near to the steer- knuckle, thus insuring easy steering, e the centre of the rear wheels may rought nearer to the rear bearings, decreasing the possibility of broken s.

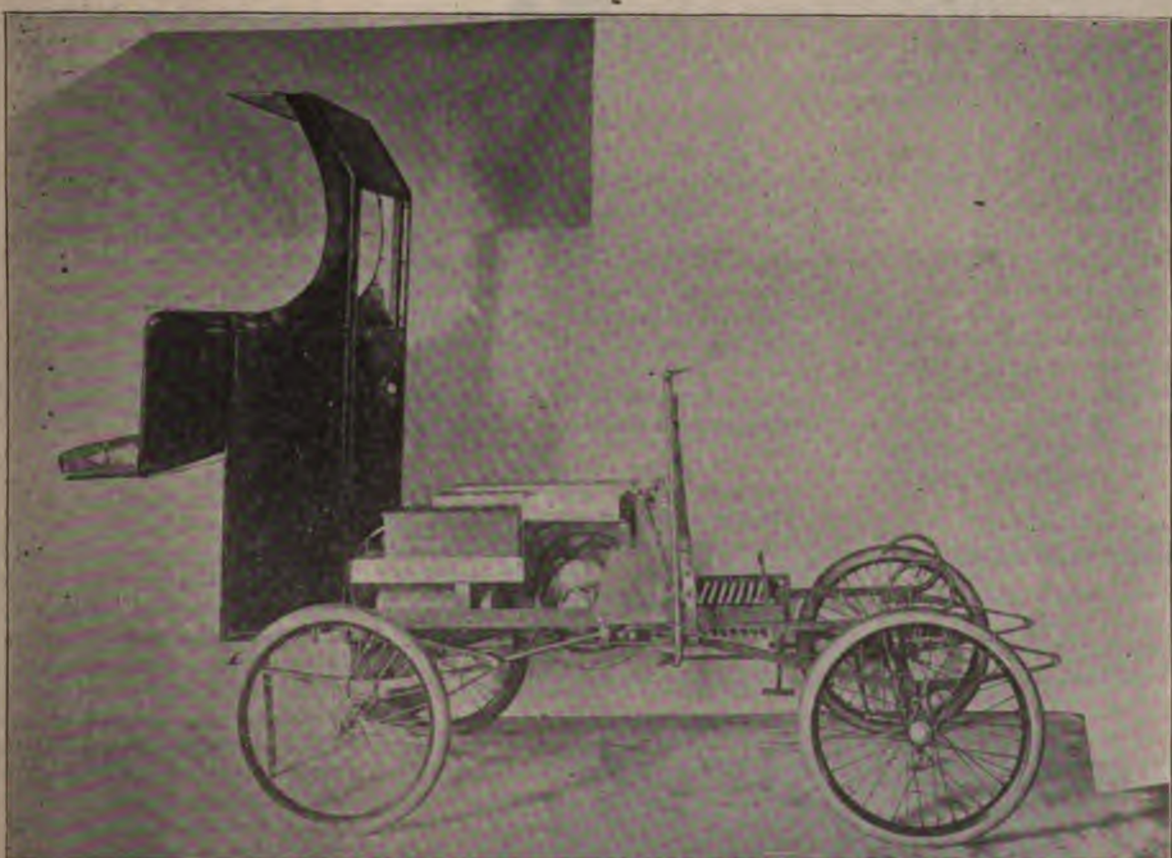
okes are furnished for 1 1-16 inch square 5-16 tubular front axle. Hubs are de- ed for 1 inch or 1⅛ inch spokes for automobiles having a maximum load of 1,000 pounds with 400 pounds on the front axle. They are made in rights and lefts. All races are ground in position, while the



AMERICAN BALL BEARING COMPANY'S HUB.

cones and cone seats on spindles are ground to gauge.

The company now make for the automobile trade the complete axle shown in cut, except compensating gear and brake. However, the gear cover is designed for No. 1, No. 2 or No. 3 Brown-Lipe compensating gear. The boss for the brake is drilled and faced ready for brake bands and connections. The axle is key seated for hubs and gears, and all fits are ground to gauge, while the races in the outer



B. & P. METAL BODY.

sleeves are ground in position. The centre line of sprocket and track of vehicle may be changed as required. Spring seats may be clamped on the outer tubes, or such as are furnished by the company will be placed between bearings before brazing. No brazing must be done on these axles after delivery is made. All of these bearings and axles are built on machines of the company's own design.

The "Ideal" Gasoline Carriage.

The accompanying cut shows the new "Ideal" gasoline carriage manufactured by the B. & P. Company, Milwaukee, Wis., which differs from other makes inasmuch as it is made wholly of metal. The whole vehicle is constructed and coupled together on an angle iron frame, which not only holds the engine in place, but attaches to the springs and makes possible a reachless running gear. The springs are long and flexible, securing a very easy riding car and making the vibrations of the engine hardly perceptible.

The specifications are as follows: Five horse power, single cylinder, horizontal motor, three changes of gear; length over all, 8 feet 10 inches; width over all, 4 feet 8 inches; height, 5 feet; wheel base, 68 inches; wheels, 28 inches diameter; weight, 1,200 pounds; width of seat, 3 feet. The tank capacity is 100 to 150 miles and the maximum speed is 20 to 25 miles per hour.

The cut of the body, on page 177, shows how at any time or place the owner may open his car, thereby getting at all working parts without covering himself with grease.

All of these cars are constructed with spokes of No. 9 gauge; hubs, $5\frac{3}{4}$ inches; axles, No. 9 gauge tubing, and very heavy steering knuckles.

The same manufacturers also turn out several different designs of gasoline engines for automobile manufacturers, one being adapted for carriages of light construction, weighing from 700 to 900 pounds. It is $4\frac{1}{2}$x6, weighs 210 pounds and is said to develop in brake horse power from $3\frac{1}{2}$ to $4\frac{1}{2}$. The crank shaft is 24 inches, the flywheel $20\frac{1}{2}$ inches and the weight 110 pounds. The length of the engine is 37 inches and the width $6\frac{1}{2}$ inches. These engines the company state they are making for different auto companies of this country.

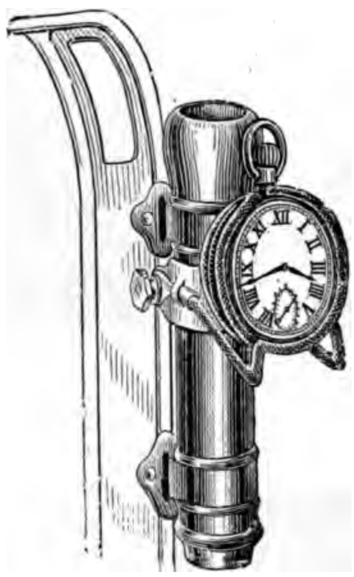
Seamless Steel Tanks.

The accompanying cut illustrates the seamless steel bottle which the Standard Welding Company, Cleveland, Ohio, are placing on the market. These receptacles are made in various sizes up to 4 inches diameter, and from 6 to 24 inches long. The walls are $\frac{1}{8}$ inch thick in the small tanks and 3-16 to $\frac{1}{4}$ inch thick in the large bottles. The necks are tapped $\frac{1}{2}$ inch gas pipe, but will be tapped for a $\frac{3}{4}$ inch pipe connection if the purchaser desires to have them tapped that size.

Open hearth steel of the best grade is said to enter into these containers, which will sustain an internal pressure of 3,000 pounds per square inch.

Burleigh's Watch Carrier.

Geo. K. Burleigh, of Tilton, N. H., has devised a watch carrier to go on the steering lever of an automobile. It clamps to a steering lever from $\frac{1}{2}$ to 2 inches in diameter; weighs only $1\frac{1}{4}$ ounces and will carry either a 16 or 18 size watch, a watch clock, or little 2 inch clock. It is warranted not to injure the most delicate watch. The carrier being made of fine spring wire, covered with woven linen thread, is claimed to fully protect the watch from any jar and against injury of the jewels or pinions. The inventor of the device is a watch maker and states that he has tested it over many miles of rough roads.



BURLEIGH'S WATCH CARRIER.

There has been an extraordinarily rapid increase in the membership of the A. C. G. B. and I. this year. On July 14 100 new members were admitted, and the total increase in membership since January 1 amounts to 650. On October 1 the entrance fee is to be raised to £10.

MINOR MENTION

An automobile club has been formed at Denver, Col., with ten charter members.

George Kessler, of New York, is said to have paid 72,000 francs for a 40 horse power Mercedes.

Garrett and Auburn, Ind., are to have an auto stage line. If it is a success it will be extended to Waterloo.

The Long Island Automobile Club has applied for membership in the Associated Road Users' Organization.

The Consul General at Yokohama reports to the State Department that the postal authorities are considering American automobiles for transporting the mails at Tokio.

The Automobile Club of New Jersey has made a new departure in the regular weekly run. They leave Newark at 3 o'clock each Saturday afternoon, returning the following day.

The Schilder & Gramm Automobile Manufacturing Company, Chillicothe, Ohio, is completing a ten passenger machine that is to run between that city and Bainbridge.

The supervisors committee on poor of Buffalo, N. Y., has recommended the purchase of an automobile ambulance for the use of the county hospital. The vehicle is to cost $3,150.

J. B. Lyford, of Bridgeport, is said to have made a trip from Bridgeport to Boston and return in a steam carriage recently in twenty hours. No repairs, it is said, were required or made.

President A. R. Shattuck, of the A. C. A., and C. F. Bishop, have closed their "school for horses" after having accustomed practically all the horses in the vicinity of Lenox, Mass., to the motor vehicle.

D. T. Ray purposes to establish an automobile service at Red Bluff, Cal. He has been appointed sole agent for California and adjoining States for the sale of the Chicago Motor Vehicle Company's machines.

The brick work on the new automobile factory at Streator, Ill., has been completed and the roof is being put on. The building is 37x200 feet and two stories high. The management expect to have the factory in operation in about sixty days.

Automobilists and all others interested in good roads are to be asked to join the newly organized New York-Chicago Road Association. The annual membership fee has been fixed at $1, to make the movement a popular one, and all who joined the League of American Wheelmen at the recent national meet in Atlantic City, during which a good roads convention was held, were also made members without additional fees of the New York-Chicago

STANDARD SP

tion and the Highway Alliance of ork.

Apperson Brothers Automobile ay, of Kokomo, Ind., are building : story extension to their present g. When the building is completed al floor space will be 28,480 square

er & De Gress, of Long Island City, king for another factory or shop lo- to accommodate their growing busi-

r. Henry, Detroit, Mich., has taken ency of the Niagara Motor Vehicle ny, and is located at 250 Jefferson

reported on good authority that the Iotor Works are developing a new for 1903. A double cylinder motor ive the vehicle.

Automobile Club of California is ng for a club run to Hotel Mateo, ateo, in the near future. It has in- ne San José club to participate.

ge W. Hill, of New York, is mak- extended automobile tour of the r resorts, principally through the dacks, Central New York and lvania.

proprietor of the Livingston Hotel, ter, N. Y., is in the market for an omnibus to take the place of two irawn 'buses now in use. It costs per year to maintain the latter.

ouis capitalists are planning to run stages from that city to Creve Lake. Five machines will be re- John H. Blessing is president of npany.

nas B. Jeffery & Co. emphatically at they have lodged a protest with icago Automobile Club against the n of the judges in the 100 mile con- stated in Chicago papers. They r the contest a great success.

Kansas City Automobile Club has permanent officers as follows: Pres- Louis Curtiss; vice president, Ferdi- Heim; secretary, M. C. Albertson; er, C. F. Lovejoy. Twenty-two rs were enrolled at the first meeting.

Vehicle Repair Company of Amer- lew York, agrees to repair all e to vehicles for a stipulated sum num. Damage by wear or defect in al is not included in the contract by this company. The New York of the company is at 72 Trinity place.

Geo. N. Pierce Company now hold iable record as winners in endurance s. Not only did their little machine p very well in the severe New York- ster endurance contest last fall, but made a perfect record in each of the leading 100 mile endurance contests is year.

Duryea Power Company announce ction of 5 per cent. from their list to all buyers whose orders are filled February 1, 1903, believing that this t can be saved, as well as better given, on orders received during the fall and winter, when they are not over-rushed with business.

An automobile 'bus line is spoken of in LaCrosse, Wis.

A salesman for the Ward Pump Company, Rock Island, Ill., has been provided with a steam carriage to cover his territory.

Twenty-three automobiles are owned at Wheeling, W. Va., which shows that the South is progressing in automobile matters.

"Snorting and snuffing and panting and puffing" is the way a Brooklyn reporter describes the action of a free running motor on a big French automobile.

The Love Manufacturing Company, of Rockford, Ill., are turning out four automobiles for Charles Cotta and Frank Morse. The machines are propelled by steam and have a four wheel drive.

We acknowledge receipt of two photographs, one of the luncheon given to S. F. Edge, winner of the Gordon Bennett cup, at the Hotel Cecil, London, July 22, and the other of the dinner given in his honor at the Hotel Metropole, London, July 23.

The Cleveland Automobile Club have decided definitely upon September 16 as the date of their race meet. The famous "Glenville" track will be used. Among the various events are a 10 mile handicap, an obstacle race and pursuit race. Entry blanks are now out.

The following new members were elected to the A. C. A. at the meeting of the board of governors on July 31: Active, Charles W. Place, William Howard Barnard and Solomon Hanford; associate, Fred M. Ayers, of Indianapolis. Gen. Roy Stone and Jefferson Seligman were appointed delegates to the Associated Road Users.

An automobile livery is said to have been established in Minneapolis recently. The prices are $1.50 an hour for single autos, and $2 for double ones. A chauffeur is sent along, except where one of the party gives satisfactory evidence of understanding the management of the machine. The price, however, is the same, whether a chauffeur is included or not.

The Winton Company, Cleveland, have been looking for a location for their downtown store for some time, but nothing has been decided upon as yet. Several sites have been suggested; one is the old Music Hall building, which was destroyed by fire some time ago. Much money will be expended in equipping a complete repair shop and commodious quarters for storing machines of their patrons.

Arrangements have been completed by the State Prohibition committee for a campaign tour of Minnesota in a large automobile. A twelve passenger break has been purchased for the purpose and fitted with a 28 horse power gasoline engine. Half a dozen orators will make a canvass of Minnesota in the great carriage, covering all the districts save the more sparsely settled sections. The initial automobile Prohibition rally will be held at the State Fair next month.

Gasoline is now retailed in Brooklyn, N. Y., at 20 cents a gallon.

Worcester, Mass., motorists are talking of organizing a club.

Frank Burgenheim, Louisville, Ky., has recently completed an automobile for passenger service.

"Kid" McCoy (Norman Selby), the pugilist, it is said, has secured the American agency of the Renault machines.

The Monida and Yellowstone Stage Company proposes to operate automobile stages in the Yellowstone National Park.

The machinery of the Steamobile Company, Keene, N. H., was sold to the Roller Bearing Company, of Philadelphia, Pa., recently.

Topeka, Kan., is to have an automobile club. Automobilists of Wichita, Arkansas City, Hutchinson, Kingman and Winfield will be asked to join.

The Peerless Manufacturing Company, Cleveland, have decided to move their factory to Lorain, Ohio. The final preparations are now being made for the move.

Miss Nina Hay, of Saginaw, Mich., is reported to have started out in a 16 horse power car with a party of friends for Atlantic City. No chauffeur accompanies them.

The fifth automobile ascent of Mount Washington and the first this season was made August 1 by R. C. Read and H. E. Clapp, of Attleboro, Mass., in a machine weighing a ton. Time, about three hours.

More than 1,600 automobiles are registered with the Secretary of State at Albany, and it is asserted that this number does not represent even 50 per cent. of those owned in New York State.

The automobile express service of Boston, Mass., was extended to Brookline on August 1. It is thought that small expressmen will be crowded out. A single company delivers for the department stores in the suburbs.

The Cleveland Automobile Club are rapidly increasing in numbers and are looking about for suitable club rooms. The influence of the club has been felt in Cleveland by their efforts in securing just speed laws and assisting the authorities in enforcing them.

The Climax Electric Storage Battery and Vehicle Company was organized at Portland, Me., to manufacture automobiles and carriages operated by steam, electricity, gasoline or any other power, $500,000 capital, $150 paid in. President, William Bowker, of Waltham; treasurer, John Oldfield, of Boston. Certificate approved July 30.

The Standard Automobile Company, Columbus, Ohio, expects to have its products on the market shortly. There are two other builders of machines at that place, the Columbus Motor Vehicle Company and the Motor Truck and Vehicle Company. The latter has built a number of trucks, one of which was delivered in

July, 1901, and covers 55 miles every day at a cost of 62 cents for fuel, it is said.

Irving Crane is establishing a motor stage line at Colorado Springs, Col.

A company has just been incorporated at Portland, Ind., to operate an automobile transit line. Capital, $10,000.

H. W. Whipple, a prominent member of the A. C. A., is said to own twelve machines. At present he is in France studying the situation.

A company to operate an automobile bus line is being organized at Hutchinson, Kan., with $10,000 capital. J. P. Shunk is promoting the affair.

Banker Brothers, of Pittsburg, Philadelphia and New York. will market a gasoline racer next year which is to be called the "Banker."

The Rutenber Gasoline Engine Company, of Chicago, is said to be building an automobile to the order of C. W. Swift, a member of the packing firm of Swift & Co.

On August 5 an order was signed by Vice Chancellor Stevens at Newark, N. J., that the property of the Automobile Company of America be sold by the receiver, Henry Cryder.

A. Ward Chamberlain, chairman of the signpost committee of the Automobile Club of America, has completed the erection of signs on the Hudson County (N. J.) boulevard. More than one hundred enameled iron signs were put up on the road from Fort Lee to Bergen Point.

Legislative and Legal.

By a recent ruling of the license commissioner of St. Louis, Mo., local users of motor cycles are compelled to pay an annual fee of $10.

Napoleon, Ohio, has adopted a speed ordinance. Offenders will be fined from $5 to $50 for violations or sent to the workhouse for ten to thirty days.

The city fathers of Newark, N. J., have decided that the name and address of the owner and registered number of the machine must be painted on every automobile.

The board of review of Chicago are of the opinion that the machine of the Chicago Automobile Club's treasurer is worth more than $540, which is the amount of his assessment.

T. van Vlissingen and M. K. Devitt were arrested for scorching at Glencoe, Ill., recently. N. G. Harris was fined $25 and costs at Glencoe for furious driving by Justice Lane on August 3.

In the future every automobile in Denver, Col., must be registered and display a number by which its owner may be identified. The numbers are to be 8 inches high and 4 wide. Engines in automobiles standing at the curb will not be allowed to run for more than five minutes. In the downtown section of the city a speed of 8 miles per hour must not be exceeded. Fifteen miles per hour is the rate at which motor vehicles may travel in other parts of the city. Motor cycles are regarded as self propelled vehicles and must comply with the same regulations in general.

The National Association of Automobile Manufacturers is to make an effort to have the Government reconsider its discrimination against motor vehicles in its ordinances forbidding their entrance into Yellowstone Park.

An adjournment was taken in the test case of "Wally" Owen, arrested for alleged furious driving of a machine at Freeport, L. I. S. W. Merrihew and Isaac B. Potter, of the A. M. L., appeared in the defendant's behalf.

The officials of Ocean Township, N. J., who govern Monmouth Beach, have an ordinance in force which says that "any owner of a horseless machine caught driving faster than 6 miles an hour shall be fined $30 or imprisoned thirty days, at the discretion of the judge."

A motor bicycle race scheduled to take place on the Speedway at Atlantic City during the League of American Wheelmen annual meet was cancelled owing to the passage of an ordinance limiting the speed of motor vehicles and motor cycles to 6 miles within the city limits.

At Buffalo Justice Murphy on August 2 convicted Erio Mock of running his automobile faster than the law allows in Bidwell Parkway on the night before and suspended sentence with a warning. Bicycle Patrolman Gookson, who arrested him. said he was going at the rate of 18 miles an hour.

An ordinance was passed at Westerly, R. I., regulating the speed of automobiles at 8 miles an hour and in the country at 12 miles an hour, with a penalty affixed for violation—for the first offense $20 fine and for each subsequent offense or violation an added penalty of ten days in the Washington County jail.

The wife of Ariel B. Scott, of West Tisbury, Martha's Vineyard, has brought an action against Edw. A. Mulliken for $10,000 damages. It is alleged that the defendant caused Scott's death on July 19, when the latter was found dead in the road shortly after the former had passed by in his machine.

The corporation counsel of the District of Columbia recently decided that all automobiles operated within the District must be considered as private vehicles, and therefore not entitled to the privileges of the public cab stands. The managers of the local Electric Vehicle Transportation Company will file an appeal.

The Boston Transit Company, which was organized to operate automobiles, was dissolved by Judge Knowlton in the Supreme Court as a Massachusetts corporation on August 5. The capital stock was $100,000, divided into 1,000 shares, and the dissolution was asked upon petition of the stockholders, as a result of their action at a meeting held last August. All debts npany were paid and all its assets disposed of, and it had business.

Long Branch, N. J., legi fixed a speed limit of 6 miles automobiles.

Norwood, Ohio, has a spee ordinance. Eight miles per limit.

The automobile of J. H. Ro rick L. I., burned up near L. I., July 31.

The Rochester board of fir ers is taking up the questior forms and rates for insuring

Two judgments against th Bouton Motorette Company ed in the Queens County cle August 1. The amounts are $120.42.

An ordinance limiting auto to 7 miles an hour and impo $25, $50 and $100 for a first, third offense respectively has duced in the Darby, Pa., bo cil.

The town council of Cliftо had drafted an ordinance re speed of automobiles wl through the village at 8 miles when passing another vehicl an hour.

Owners of steam vehicles olis, Minn., have been notifi Steele, State boiler inspector trict, that every steam vehi submitted for inspection, at every year, in accordance wi inspection law of the State.

Automobile Accid

The automobile of John O destroyed by fire on July 31 a ton avenue, Brooklyn, New Y

Mrs. Lizzie Whiteman has for $20,000 against Robert B. Madison, N. J. The defend and killed C. F. Whiteman chine on May 25.

Mrs. Wm. Anderson was kı by the fender of an automol by Chas. Bates at Boston, J machine is said to have been rate of 3 miles per hour when happened.

Mrs. R. B. Ewing, of Valp was killed in an automobile August 5. A screw, it is said and control of the machine w chauffeur, T. F. Galcy, fell fr and was seriously injured.

At Sedalia, Ind., on Augus driven by W. H. Eikenberry at the automobile of Sam. M ran away. The animal ran i chine and had to be shot.

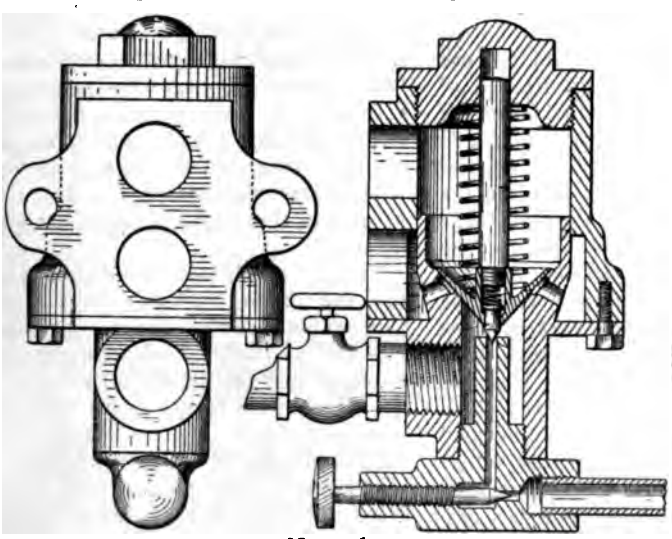
On the afternoon of July 3 out in the station of the Bri tomobile Club, and spread to building. A few light vehicle out, but six heavy machine stroyed. Loss, $50,000.

MOTOR VEHICLE PATENTS..

United States Patents.

706,050. Mixing Valve for Gas or Gasoline Engines.—Roy E. Hardly, of Detroit. Mich. August 5, 1902. Filed May 6, 1901.

The valve of this invention is adapted to control both the gasoline ports and the air ports at one and the same time, thus dispensing with the use of separate valves for this purpose; and the invention consists of a single suction valve adapted to control the admission of either gas and air or gasoline and air to the mixing chamber, and a spring backed secondary valve carried by the suction valve and adapted to control the gasoline inlet port free to



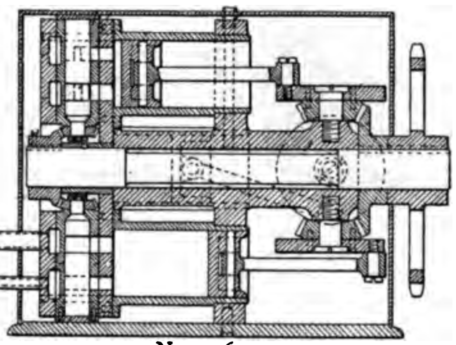
No. 706,050.

have a limited vertical movement irrespective of the movement of the main valve, thereby insuring the perfect seating of the same and obviating the battering of the gasoline valve seat by impact of heavy parts.

706,320. Steam Engine.—James A. Jennie, of Providence, R. I. August 5, 1902. Filed May 9, 1901.

The engine is intended for use on vehicles, boats, etc. It dispenses with stuffing boxes, flywheel and piston rod. By the positive action of its novel valve structure friction and noise are claimed to be avoided. The circular multiple cylinder arrangement affords a steady exhaust, and the symmetrical contour makes it possible to inclose the engine gearing in an oil chamber and escape injury from grit.

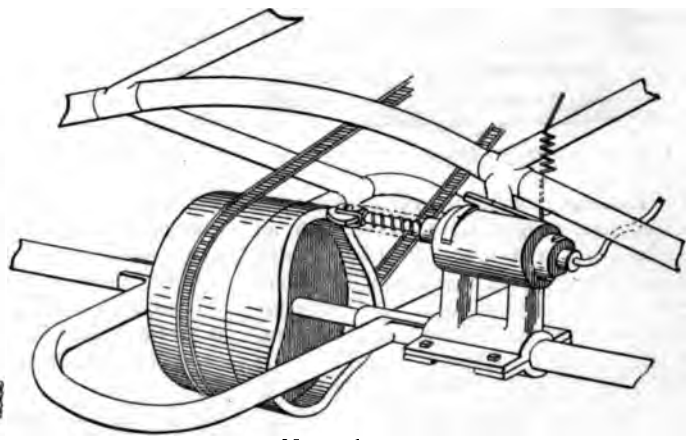
The engine has four single acting cylinders, and is provided with rotating valves in the cylinder heads. The four pistons work upon separate cranks, which are geared by means of bevel gearing to a main shaft parallel with and in the centre between the four cylinders. At one end this shaft has keyed to it a sprocket wheel by means of which the power is to be



No. 706,320.

transmitted from the engine, and at the other a bevel gear through which the valves are rotated.

The piston and valves of each cylinder are so adjusted that when the stroke in one cylinder is completed the piston of the next adjacent cylinder has made half of the stroke, thus assisting the first piston past the centre. This action takes place successively in each of the cylinders, with a result that there are two outwardly moving pistons and two exhausts open at the same time. The entry of steam into four cylinders from the same chamber and the exhaust of all the cylinders into an adjacent independent chamber dispenses with a complexity of pipes.



No. 706,051.

706.051. Automobile Air Pump.—John G Heal, of Detroit, Mich. August 5, 1902. Filed September 24, 1901.

The air pump is designed to be applied to the running gear of an automobile and to compress air for the pressure tank thereof. A crown cam is mounted on the driving axle and the air pump is fixedly located perpendicularly to the plane of the cam wheel. The piston rod thereof engages the cam and actuates the piston of the air pump to compress air therein. The piston is brought back by means of a spring on the piston rod. A clamp is provided which frictionally engages the piston rod. The clamp is controlled by a latch or lever, one end of which impinges upon the clamp and the other end is controlled by a flexible spring attachment.

The flexible spring attachment for raising the latch is continued to a hand lever at the seat and the raising of the outer end of this hand lever would bring pressure to bear upon the piston rod by means of the clamp, and this pressure is sufficient to lock the piston rod and therefore to prevent the reciprocations of the pump.

706,415. Driving Gear for Automobiles.—Alfred Hitchon, of Clayton-Le-Dale, England, August 5, 1902. Filed April 12, 1902.

706,444. Composition for Use in Secondary Batteries.—C. T. J. Oppermann, of London, England, August 5, 1902. Filed January 11, 1902.

In order to render the active material harder and more coherent, the lead oxide is made up into paste with dilute sulphuric acid, to which is added a small proportion of a binding substance insoluble in sulphuric acid. The substance employed for the purpose is bitumen (preferably Trinidad bitumen) dissolved in a light hydrocarbon, preferably benzine, the solution of bitumen in benzine being diluted with alcohol in order to render it miscible with the dilute sulphuric acid. The proportions found to answer well in practice are as follows: Dissolve 1 ounce bitumen in 10 ounces (one-half pint) of benzine, and dilute this solution with 40 ounces (one quart) of alcohol (methylated spirit) and add this diluted solution to sufficient dilute sulphuric acid (of about specific gravity 1.170) to make with 100 pounds lead oxide a paste of the required consistency; or the sulphuric acid solution may be omitted, in which case 100 ounces of the dilute bitumen solution would be required for 100 pounds of lead oxide; or the alcohol may be omitted from the bitumen solution, in which case 100 ounces of solution of bitumen in benzine alone would be added to 100 pounds lead oxide to form a dry mass, to which sufficient dilute sulphuric acid would then be added to form an easily workable paste.

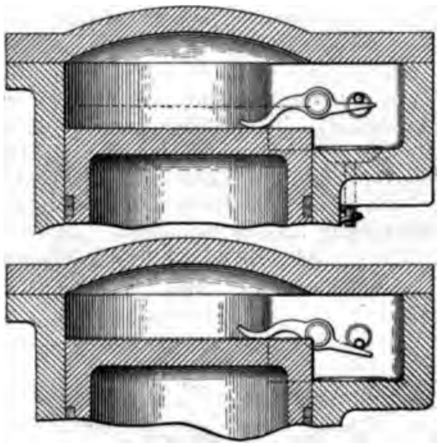
After applying the above described paste to the support it is dried thoroughly at a low temperature, whereby to evaporate the solvent of the bitumen and so cause the latter to cement together the particles of the active material.

The cementing action produced by the above mentioned proportion of bitumen

gives such a degree of hardness to the active material as to greatly increase its durability without materially affecting its ampere hour capacity; if the proportion of bitumen be materially increased the hardness and durability will be so much the greater, but the ampere hour capacity will be proportionately less.

706,492. Sparking Igniter for Explosive Engines.—Joseph Lizotte, of Quincy, Mass., August 5, 1902. Filed December 11, 1901.

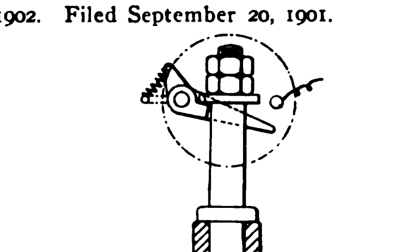
A make and break igniter operated by the piston of the engine. The movable contact is a double armed lever located in the compression chamber of the engine.



No. 706,492.

The stationary terminal, which is the insulated one, is formed by a rod with an eccentric pin at its end. By rotating this road the time of the spark can be varied.

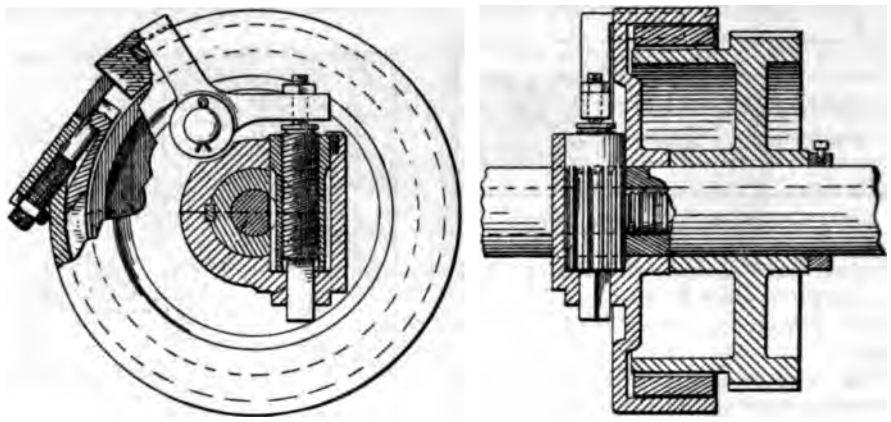
706,121. Ignition Gear for Internal Combustion Engines.—Frederic R. Simms, of Bermondsey, England, and Robert Bosch, of Stuttgart, Germany, August 5, 1902. Filed September 20, 1901.



No. 706,121.

The invention refers to timing mechanism for make and break ignition devices.

The operating cam is located in an enclosed box, and the trip rod, through the medium of which the sparking device is operated, is guided in the box. Between the cam and the trip rod is arranged a sliding push piece, which serves to transmit the motion of the cam to the trip rod, the position of which push piece determines the point at which the trip rod is acted upon by the cam.



No. 706,081.

706,081. Friction Clutch.—Louis P. Mooers, of Cleveland, Ohio. August 5, 1902. Filed October 30, 1901.

This friction clutch is adapted for use in connection with the change gearing of motor vehicles, and is operated from the centre of the hollow shaft on which it is mounted. The clutch comprises a member with a cylindrical flange, keyed to the shaft, and another similar member loose on the shaft. The cylindrical flange of the latter is smaller in diameter than that of the former, into which it projects. The difference between the diameters of these two flanges is such that the annular space between them is somewhat wider than the thickness of a split clamping ring, which is carried by the fast member and is adapted to be contracted against the flange of the free member for the purpose of connecting the two independently rotatable members. When motion is to be transmitted from the constantly rotating shaft the split ring is caused to grip the cylindrical flange of the free member, to which a gear wheel is connected.

The split clamping ring is made of resilient metal and will normally occupy a position in contact with the internal surface of the outer flange and out of contact, but close to the external surface of the inner flange. A screw, which screws through an external boss on the keyed member, enters a groove in the outer periphery of the split ring and abuts against a shoulder at the end of the groove. On the outer periphery of this clamping ring, near the other end thereof, is a shoulder, which projects outwardly through a slot in the outer flange. An angle lever is pivoted to the keyed member, and one arm of this lever extends outward and over the outer flange and against the shoulder. By rocking this lever in the proper direction it will decrease the diameter of the ring and cause it to grip with more or less force the cylindrical inner flange. One arm of the lever extends over the end of a screw, which screws through a nut rotatably mounted in a cylindrical recess, formed partly in the keyed member and partly in the shaft, which recess intersects the longitudinal opening through the shaft. The nut is provided with peripheral gear teeth, which engage with rack teeth on a rack bar longitudinally movable in the shaft. This nut abuts at one end against the bottom of the recess in which it is mounted, and the head of a screw, which is screwed into the keyed member adjacent to this recess, engages with the outer end of this nut, by which means endwise movement of the nut is prevented. The screw has at its inner end a square shank, which is fitted somewhat loosely in a hole in the bottom of the recess in which the nut is mounted.

To allow of adjusting the clutch for wear one end of the operating lever is fitted with set screw with lock nut. Adjustment can also be made by means of the screw coacting with this lever, and by means of the screw in the flange of the keyed part.

706,494. Motive Power Engine.—Martin T. Minogue, of Springfield, Ohio. August 5, 1902. Filed June 5, 1901.

706,366. Internal Combustion Motor.—Adolf Vogt and Max von Recklinghausen, of Westminster, London, England, August 5, 1902. Filed June 25, 1901.

706,120. Engine.—Sidney H. Short, of London, England. August 5, 1902. Filed November 15, 1901.

706,021. Device for Inflating Pneumatic Tires.—Frederick W. Claesgens and John G. Magin, of Rochester, N. Y. August 5, 1902. Filed February 15, 1902.

706,167. Gas Engine.—Thomas Doherty, of Sarnia, Canada. August 5, 1902. Filed January 3, 1902.

706,181. Rotary Motor.—Carl A. Hult and Oscar W. Hult, of Stockholm, Sweden. August 5, 1902. Filed December 5, 1899.

706,439. Motor Vehicle.—Harry M. McCall, of Pittsburg, Pa. August 5, 1902. Filed March 7, 1902.

705,768. Wheel Tire.—Hyman Lieberthal, Chicago, Ill. July 29, 1902. Filed May 5, 1902.

705,839. Thrust Bearing.—Albert E. Henderson, Toronto, Canada. July 29, 1902. Filed April 5, 1902.

705,863. Bearing.—Henry H. Porter, Dowagiac, Mich. July 29, 1902. Filed January 5, 1900.

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The New York-Boston Endurance Contest.

The preparatory work is now well under way for what promises to become "the great American automobile event of 1902"—the New York-Boston and return endurance contest, which the A. C. A. will hold October 9 to 15. At a recent meeting of the contest committee a number of changes were made in the original program; one of these changes is that instead of holding the contest on six consecutive days of a week, from Monday to Saturday, as originally planned, it is to be run in two stages, as it were, the run to Boston taking place on Thursday, Friday and Saturday, and the return during the first three days of the following week, the contestants spending Sunday in Boston.

This change will certainly be approved of by prospective contestants. The drivers of the competing vehicles are subject to considerable physical and nervous strains, and the intervening day of rest will ease their task considerably.

Another change in the plans provides that the return shall be over the same route as the run to Boston. This change was undoubtedly made to reduce the work of organization. The trouble of demarcating the road and making arrangements for storage facilities, hotel accommodations, etc., is thereby approximately halved. There would have been a certain advantage in returning over a different route, as more people would have had a chance to see the passing machines, but this advantage is slight. In the part of the country through which the course of the contest leads automobiles are no rarity, and the simple sight of a considerable number of them in organized procession would be less effective in stimulating the desire to possess one of them than the press reports of the creditable showing of the vehicles over the whole course which we expect. The simplification and reduction in the number of control stations will permit having more perfect arrangements, which are so much to be desired.

The rules of the contest are not yet published, but to judge from the discussions on the rules held at club meetings last spring it appears that it is to be essentially a non-stop run. If this be the case we wish to make a suggestion based upon experience in the two 100 mile non-stop contests of last spring. With gasoline vehicles having a shifting gear transmission it sometimes happens that in changing gears, particularly in going up a hill, the operator "misses" the gear and only succeeds in "catching" it after the vehicle has begun to run backward. Theoretically a stop must precede the reversal of motion, which is, however, only momentary. This is a characteristic of machines with shifting gear transmission, and occurs frequently in regular operation. It appears that for this reason, and because the occurrence is not due to any breakdown or fault developed, such momentary stops should not be penalized. This was the decision arrived at by the jury in one of the contests referred to above.

It might be well to consider the eventuality of momentary stops due to this cause in the rules.

Another Speed Craze Sacrifice.

On August 14 Charles L. Fair, of San Francisco, millionaire and society man, was killed in an automobile accident at Pacy-sur-Eure, France, while on a trip from Trouville to Paris, accompanied by his wife and a professional chauffeur. Mrs. Fair was also killed and the chauffeur, who sat in the tonneau seat at the time of the accident, was stunned, and according to one report became insane. The party was driving in a 40 horse power Mercedes Simplex machine, recently purchased through Henri Fournier. Before the machine was delivered it had to be demonstrated, so it is reported, that it was capable of a speed of 50 miles an hour. At the time of the accident Mr. Fair was at the wheel, and he was driving along at a high speed, when suddenly the machine became unmanageable, swerved and crashed into a tree, with the result that all three occupants were hurled out and the two in the front seat instantly killed. According to a statement in *Le Vélo* it

was the bursting of a tire which caused the accident, but as in most cases of this kind it may remain a mystery just what caused the vehicle to swerve. The frightful results of the accident must be ascribed to the terrific speed at which, according to the single eyewitness, the machine was run.

During the last few years it has become the custom for the fashionable folk of Paris, both native and foreign, to travel to the coast resorts by automobile, rather than by train. This practice in itself is certainly to be commended, but the manner in which the trips are made would be more commendable if the automobilists showed some respect for the regulations which are supposed to control automobile traffic in that country. They have so far, as a rule, absolutely disregarded these regulations and tried to approach railroad speeds between Paris and the coast. It is a tragic coincidence that only a few days after the world's speed records were broken by W. K. Vanderbilt, and while the news thereof was still re-echoing in the press, his brother-in-law should meet his death in a speed debauch.

The accident has made a profound impression and has been given an unusual prominence by the daily press, owing to the social position of the parties concerned. It will no doubt have at least some slight influence upon the automobile enthusiasm of society, and it may be expected that the demand for machines "guaranteed to go 50 miles an hour" will drop off some in the near future. It was to be foreseen that the course the automobile movement has been taking abroad in the last few years must shortly approach a climax or turning point, and moderation has been counseled in these pages continuously, both to the manufacturers as regards the building of excessively powerful machines and to the owners as regards the indulgence in dangerous speeds. It seems, however, that nothing short of repeated fatalities will turn the course of the movement in the opposite, safe direction.

The Farmers' Attitude.

It has been generally supposed that the attitude of farmers toward the automobile was one of opposition, and that the cause of this opposition was the fear that the competition between motor and horse would bring losses to both horse breeders and agriculturists. Frequently, when it has been proposed in agricultural districts to deal forcibly with automobile speed offenders, it was pointed out in the press that the farmers were the natural enemies of the automobile and that their antagonism to the usurpation of the road by automobilists was therefore quite explicable.

As a matter of fact, the average farmer is not, and never has been, a decided opponent of the automobile movement. We know of some farmers in the West who in the early days of the movement traveled far and wide to the automobile factories to find a machine suitable for their requirements and satisfying their tastes, and the number of farmers in the United States who own motor carriages must now be considerable. The broad classes of the agricultural population regard automobiles with curiosity and the movement itself with more or less indifference. But the more progressive among them even think of using the motor vehicle for their own domestic uses. This is true not only in this country, but also abroad, and we reprint in another column of this issue the announcement of a motor wagon competition organized by the German Agricultural Society for vehicles particularly suited for agricultural purposes. It is required, of course, that the vehicles be driven by alcohol, an agricultural product, which, according to the announcement of the society, surpasses both gasoline and kerosene as a fuel for explosive motors.

Motor wagons have also proved quite efficient for transporting vegetables to market in large cities, both here and abroad. The heavy motor industry is developing only slowly, but it is not unreasonable to expect that when motor trucks become more common they will be used to a large extent for the transportation of agricultural products, and the farmers will be as interested in and as well disposed toward motor locomotion as any other class.

The Influence of Endurance Contests on the Quality of Construction

Like everything else in this world, endurance contests of automobiles are not perfect. It does not require an unusual amount of penetration to find some fault either with their general principle or with the manner in which they have been conducted in the past. Nevertheless these contests have been and are by far the most practical means of determining the worth of a vehicle for general use.

The endurance contest, besides its chief object of enlightening the public as to the relative reliability and practicability of the different machines, also serves the purpose of bringing out the weak points of the individual vehicles and thus enabling the manufacturers to eliminate them. In this respect endurance contests have a tendency to make for better construction. The same end is also attained indirectly, as follows: When a certain make of vehicle shows up favorably in successive contests, the public naturally concludes that it has considerable merit, and that make will come to the front; now it will readily be granted that whatever the shortcomings of our present contests may be, the vehicles that succeed in securing first class awards, and especially those which do so repeatedly, must possess exceptional qualities of reliability. The most reliable vehicle is in a sense the best vehicle, and thus the endurance contests bring the best vehicles to the front. As has been correctly stated, inferior goods can control the market for a while if they are backed by sufficient capital and commercial talent. But the ultimate success of a machine will depend mostly upon the engineering talent embodied in its design and manufacture, and while the fit will survive and the unfit disappear, even without endurance contests, the holding of such contests will accelerate this process of evolution.

The Evolution of the Automobile Joke.

When the automobile first made its appearance in the comic papers it was still in the experimental stage; that is to say, it was as yet only run by experimenters or inventors. The general public, including the comic artists, were then still in complete ignorance of the characteristics of the new vehicles and the artists had to draw upon their imagination for qualities of the vehicles which would lead to comic incidents.

Thus the automobile was first depicted as a runaway machine. Inventor Smith or Jones, while making a trial trip in his machine, forgot the operative combination and, being unable to stop the machine, had an exciting experience. The idea was undoubtedly suggested by experience with horses, for one of the weakest points of horse traffic is that hay motors sometimes refuse to be stopped at critical periods.

The idea may have served fairly well at the time, owing to the ignorance of the general public in this matter, but it was certainly not in harmony with the facts regarding the behavior of the earlier automobiles. The great trouble of the earlier inventors was how to keep their vehicles a-going and not how to stop them.

After a while the comic writers became aware that its tendency to break down and to be laid up for repairs was one of the weak points of the automobile, and then they began to exploit this phase of the subject. By this time the vehicles had passed into the hands of the public—i. e., private owners. So the general idea of a large part of the comic automobile literature during this period was that embarrassing situations may arise when an automobilist not mechanically trained has his machine refuse to mote in the open country, far away from repair shops.

Society people were among the first to take up the use of the automobile and it was generally supposed that it was the expense of keeping them that caused this class to take a fancy to autos. A goodly share of the auto jokes of this period, therefore, were based upon exaggerations of the cost of using these vehicles.

The present period in comic automobile literature may be called the "ghost" or "whirlwind auto" period. The one quality of automobiles that furnishes almost endless material to the humorist is their speediness and power. In the grosser attempts at humor the flying auto is sometimes depicted somewhat like a Western cyclone, leaving death and destruction in its wake. Other humorists tell of wayside inns having been run down in automobile races; how it takes two men to see an automobile pass, and so on.

What will be the next stage in this evolution?

Automobiles in Algeria.

Consul Daniel S. Kidder writes from Algiers under date of July 5:

"Algeria is a country specially adapted to the use of automobiles, both on account of its excellent roads and the steep grades which prevail. As far into the country as roads are built, they are constructed with great care and kept continually in repair. Many of them are military roads adapted for the rapid movement of soldiers, including, of course, artillery and munitions, the railroads being wholly inadequate for such purposes. Other roads are almost as good, owing to the necessity of bringing heavy loads of wine from the vineyards of the interior to the seaboard.

"At present, freights from the United States to Algiers are very low. The newly established Levant Line gives bimonthly service between New York and Mediterranean ports. Application for rates should be made to the Hamburg-American Steamship Company, New York city.

"The following are the names of prominent concerns dealing in automobiles: Vincent Gérin, rue Waïsse, No. 1; Le Gerrier, rue de Constantine, No. 50; Paul Mayeur, rue de la Liberté, No. 2, all of Algiers; Mentzer, Boulevard Seguin, 35; and Traut, Place de l'Evêché, Oran, Algeria."

American Representation at London Show.

Charles Cordingley, the promoter of one of the London automobile shows, has offered to come to New York to confer with the officers of the National Association of Automobile Manufacturers in regard to the exhibition which is to be held in Royal Agricultural Hall March 21 to 28, 1903. The English promoters have offered to install the American machines in a separate room if enough makers send exhibits.

The N. A. A. M. has suggested that its members combine forces and ship their exhibits all together. Assistant Secretary Unwin has figured that the total cost of sending a runabout to London and back to New York will be about $72. This amount would include the ocean freight and the salary of an attendant at London. If an exhibit is sent by the association, each manufacturer's share of the expense will be apportioned by the cubic feet of his cars instead of by their weight.

The Care of Chains.

Roller chains are one of the most efficient means of power transmission when in good condition—clean and lubricated. But when used on automobiles they require regular attention to keep them in good order. Carefully cleaned and lubricated and properly adjusted they will run with a smoothness and absence of sound that will come as a pleasant surprise to those who are accustomed to the rattle and noise that invariably result from neglect of these matters. There are various methods of treating chains, though there is only one that is thoroughly satisfactory, says a foreign contemporary. Some drivers use no lubricant at all and merely brush off the mud thrown up from the road, with the inevitable result that the chains stretch and wear badly. Others smear them with a handful of vaseline and black lead—a rough and ready treatment that is both dirty and inefficient, for the lubricant never reaches the places where it is chiefly required.

Still yet another method is to oil each link separately—a laborious task, which probably not one mechanic in fifty would ever conscientiously perform. The last, and to my mind far the best, method involves not merely the lubrication of the chains, but also their thorough cleaning, a matter of at least equal importance. Every 200 or 300 miles, more or less, according to the weather experienced, the chains should be removed from the car and soaked in a flat dish filled with kerosene. If moved about in this bath all dirt and stale lubricant will quickly be removed, and the chains can then be hung up to drain. It is a good plan to have a false bottom of perforated zinc to the bath, so that the dirt may sink through it, leaving the kerosene clean and clear for future use. The chains should then be transferred to another tray containing thick grease and placed on a stove. As the grease melts the air in the links of the chains will be driven out by the heat and replaced by the lubricant. When the air ceases to rise to the surface in bubbles the tray can be removed from the fire and allowed to partially cool, when the chains should be lifted out, hung up and well wiped over to remove the superfluous grease. Chains treated thus will run quietly and smoothly for a considerable distance, will attract very little dust, and outlive those treated by any other method. The trouble involved by this treatment at first sight seems considerable, but the whole operation, including the removal and readjustment of the chains when replaced, can be easily performed in an hour, if the proper appliances are at hand. Any good grease can be used, but the best, I think, consists of sperm oil, in which sufficient beeswax has been dissolved to render it, when cold, of the consistency of the ordinary grease sometimes used in change speed gear boxes. A small quantity of best powdered graphite may be added with advantage.

The apparent impossibility of devising any practical method of adequately protecting motor chains and the evils which result from their exposed position are doubtless mainly responsible for the increasing popularity of the system of gear drive to a live rear axle. This method of transmission certainly has advantages, such as simplicity and complete protection from the weather. The divided rear axle, however, is apt to prove a weak point unless strongly and carefully designed, while the bevel gears in some of the cheaper cars frequently wear badly. For quiet and smooth transmission it is hard to improve on a pair of good chains.

To detect the heating of a bearing a German inventor suggests painting the bearing with a paint composed of an amalgam of the iodides of mercury and copper, which will change color when heated. Bearings to which it is applied are red under normal conditions, but when a temperature of 140° Fahr. has been reached the paint becomes black.

[illegible] is perfectly true that the oil engine requires more attention than the electric motor, but when the labor of charging, [illegible] testing cells, cutting [illegible] and looking after [illegible] the multiplicity of contacts which [illegible] currents, little advantage [illegible] apparent.

[illegible] a very short time an absolutely [illegible] automobile engine [illegible] upon the market—an engine [illegible] a single frame, in [illegible] the engine proper, the speed [illegible] mechanism, carburetor, circulat[illegible] sparking generator and mechan[illegible]. When such an engine as [illegible] designed, and, above all, well made mechanically and using heavy oil for [illegible] becomes a reality, an automobile equipped with it will be hard to beat.

If a man wishes for cheap electric current for his electromobile, he can of course install an oil engine to run a generator to charge a storage battery to run a motor on his carriage to operate it as far as the next charging point. If, however, he sees

no beauty in this "house that Jack built" method of applying energy, he can give up his "pipe dream" of electrical traction, take his oil engine and put it on the carriage, and go where he likes and as far as he likes, and not be a slave to a wire.

The New York-Boston Contest Preparations.

Secretary S. M. Butler, of the A. C. A., recently made a trip over the route of the endurance run to be held next fall, and arranged for the storage stations at the various controls. The riding school at Worcester, which will easily accommodate 125 vehicles, was secured for that control. Negotiations for a spacious building at New Haven are under way. The intermediate midday controls will be at Norwalk, Hartford and Worcester. Mr. Butler said that the course, so far as roads and conveniences go, will be an ideal one.

California Automobile Club Run.

In the Automobile Club of California's run to San Mateo on August 2 twelve vehicles participated. The start was from Market street and Van Ness avenue, San Francisco, at 10 a. m., and the touring party, captained by George Whitney, kept up to the San Mateo speed limit of 15 miles an hour as they moved in line over the bay shore road to San Mateo, the rendezvous point. No trouble was encountered with teams, and before noon the party reached their destination.

In the return run each machine took its own course, but most came back by the Mission road and got home before dark. There were no mishaps and no arrests, the report concludes, as though the latter might be expected.

The Muffler Partly Responsible for the Dust Nuisance.

A writer who has made a careful study of the subject ascribes the dust nuisance largely to the position of the muffler, which is in most cases so placed that the holes through which the exhaust products of combustion escape face downward upon the road, and are, as a rule, but a slight distance from the surface of the ground. In the cases of many vehicles of 10 horse power or more the dust and small stones will be removed from the road and quite a small hole be dug should the car remain stationary for some little time with the motor running. This is certainly a defect, and it is at the same time one which is easily remedied by turning the muffler so that the holes face toward the rear of the car, of course seeing that the bottom of the vehicle be suitably protected by a metal plate, so that no danger may arise from any flame which may issue from the muffler in the event of a misfire occurring. Something might also be done in the shaping of tires.

Making a Small Steel Casting.

Many mechanics, no doubt, have heard of a somewhat mysterious process known generally by the name of "thermit." This is nothing more than a mixture of aluminum and an oxide of iron mixed in proper proportions. If a portion of this mixture is raised to a high temperature, the aluminum extracts the oxygen from the oxide of iron, reducing the iron to the metallic state, and becoming itself oxidized to alumina. The heat resulting from this oxidation of the aluminum, even though the iron is deoxidized, is so great that not only is the reaction propagated through the whole mass of thermit present in a very few seconds, but the resulting pure iron and alumina slag are quite fluid and have a temperature of about 3,000° C. (5,400° Fahr.). Iron at this temperature is so unnecessarily hot that 20 to 25 per cent. of clean wrought iron punchings or scrap may be added to the thermit, and it, too, will be melted, and so about double the yield of iron, since thermit produces about half its weight of iron.

In order to make use of thermit for our special purpose, the required quantity is put into a crucible, which is made simply of sheet iron with a refractory lining. There is a small tapping hole at the bottom of the crucible, which is covered with a wrought iron punching about as big as a shilling and perhaps ⅞ inch thick, that again being covered with ½ inch or so of dry sand. The thermit, mixed with the wrought iron scrap—which, however, must be perfectly free from oil—is then placed in the crucible, and about half a teaspoonful of a special igniting powder is placed in a little heap on the top. The crucible is supported in some convenient way, with the tapping hole directly over the mold. A small iron rod is supported by the aid of a lever, so that it can be jerked up through the hole and displace the iron blank when the iron is ready to run. When all is ready a fusee is pushed into the igniting mixture. The reaction may be watched through a dark glass (some protection to the eyes being necessary), and as soon as a quiet glowing mass is seen, free from bubbles, the time has arrived for tapping the crucible. The rod is jerked up and the iron immediately runs into the mold.

A few words may be added as to the mold. The ordinary sand mold answers well with small castings. It is best to dry it thoroughly, and it is well to paint the surface with a mixture of black lead and water. It is well, where possible, to lead the runner into the mold at the bottom, and to provide a riser for the escape of a small amount of metal. Further, as the slag formed occupies about three times the volume of the thermit iron, or about one and one-half times that of the total iron, it is well to provide a channel outside the mold in loose sand, by which the slag and any superfluous iron may escape.

Where it is required to fill a defect in a casting, or to melt on a piece of iron for any purpose on a casting or a forging, a mold must be extemporized and placed in position, and the iron run in so as to pass over the metal, which it will immediately melt on the surface, and with which it will unite. There is one precaution here, however, which should not be overlooked: if the mold is warm and is not absolutely dry, it would be sure to deposit moisture on the cold iron, which might lead to a serious accident. It is a precaution, therefore, whenever running thermit iron onto cast iron, steel, or wrought iron, to warm the metal first to a temperature which is at least hot to the hand, to prevent such condensation of moisture. The thermit iron produced as described above works in the lathe and under the file like the mildest steel.—*English Mechanic.*

The Packard Transmission.

The Packard Model F machine has, as stated in the description of a special Packard touring car in our last issue, a shifting gear transmission which has the advantage over most other gears of this kind that any gear can be obtained directly without passing through any other gear. The advantage of this construction resides, we believe, more particularly in the possibility of going directly from the high gear to the neutral position when stopping the carriage.

We illustrate herewith the different parts of the Packard transmission gear and shall describe them in turn.

THE FRICTION CLUTCH.

The friction clutch is of the disk type and is built together with the engine flywheel. In Fig. 1 A represents the flywheel and B a spider which is loosely mounted on the hub of the flywheel. The arms of the flywheel are cast with lugs C, to which is fastened a steel ring D. The arms of the spider have a lateral projection at the outer end, which is slotted to receive the steel ring. Between these projections and the lugs C on the flywheel arms are interposed coiled springs (not shown) which are placed on the steel ring D. The power from the engine is transmitted from the flywheel to the spider B through these coiled springs, which act as a flexible transmission device and tend to smoothen out the periodic variations in the speed of rotation which are characteristic of every reciprocating motor, especially those of the explosive type.

The spider B is provided with a lateral circular flange *b*, and within this flange is arranged a flat cast iron disk E keyed to the spider by the key F. This disk forms the driving member of the friction clutch. The other member of the friction clutch is constituted by two circular cast iron disks G and G', of which one is located on either side of the disk E. The disk G is keyed to the shaft H, which forms one of the shafts of the shifting gear mechanism, and the

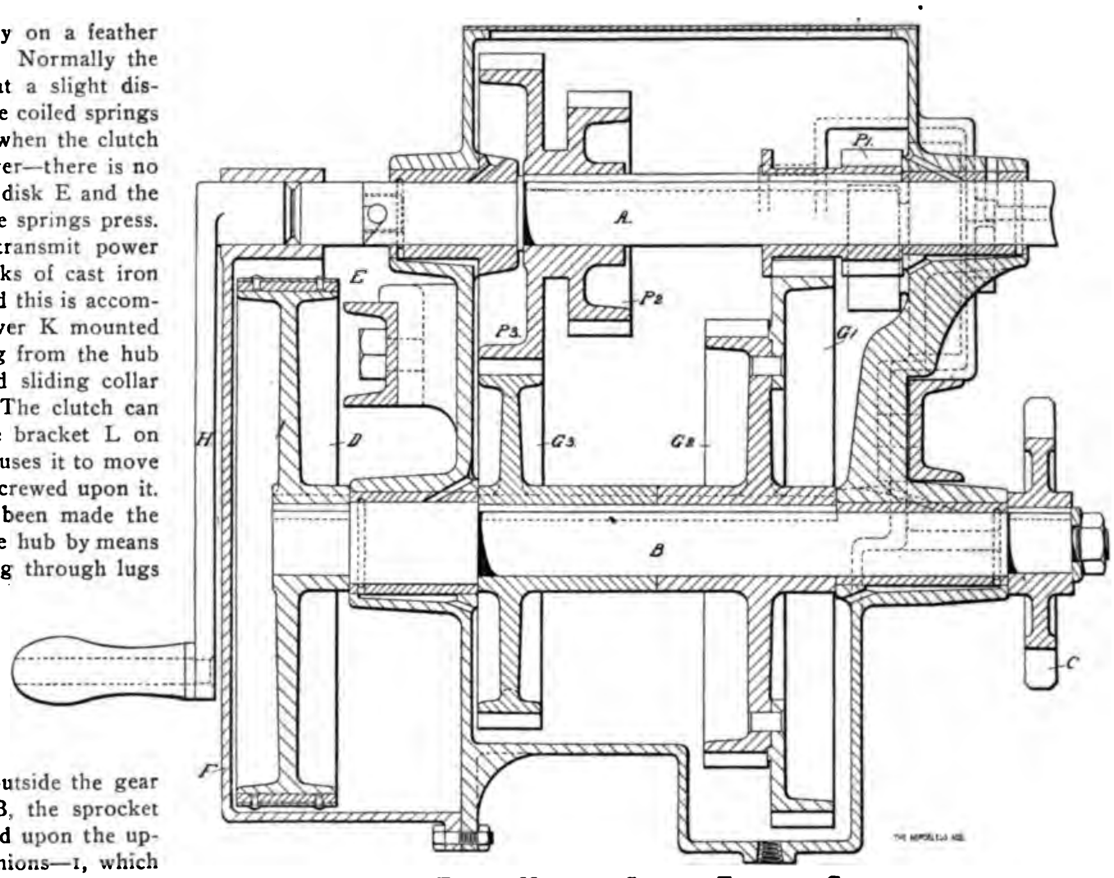


FIG. 2—VERTICAL SECTION THROUGH GEAR.

disk G' is arranged slidably on a feather key on the hub of disk G. Normally the disks G and G' are held at a slight distance from the disk E by the coiled springs I I, and in that case—i. e., when the clutch is not transmitting any power—there is no friction except between the disk E and the rings J J, against which the springs press.

When it is desired to transmit power by the clutch the three disks of cast iron are pressed into contact, and this is accomplished by means of the lever K mounted on the bracket L extending from the hub of disk G, links, a grooved sliding collar M and a shifting fork N. The clutch can be adjusted by turning the bracket L on the hub of disk G, which causes it to move along that hub, since it is screwed upon it. When the adjustment has been made the bracket is clamped upon the hub by means of a clamping screw passing through lugs on the hub of the bracket.

THE VARIABLE GEAR.

Fig. 2 is a vertical section through the gear box. The gear will be seen to comprise two shafts, the upper one, A, of which carries the friction clutch outside the gear case, and the lower one, B, the sprocket pinion C. Slidably mounted upon the upper shaft are three spur pinions—1, which serves both for the slow forward speed and the reverse; 2, which gives the intermediate speed, and, 3, which gives the high speed. Pinions 2 and 3 are formed integrally and pinion 1 is separately movable. To the shaft B are keyed three spur wheels 1, 2 and 3, corresponding to the pinions 1, 2 and 3 respectively. The shaft B, as already stated, carries at one end, outside the case, the sprocket pinion C, duly keyed to it and secured against endwise motion by a nut and washer, by which it is forced against a shoulder on the shaft. At the other end this shaft carries a brake drum D, to which a brake band E may be applied. The brake drum is also located outside the casing for the gears and is protected by a special casing F, which is cylindrical in shape and projects beyond the side panel of the body, which gives the Packard Model F its characteristic appearance. This case F also has formed upon it a bearing for the motor starting crank H, which engages, by means of a sort of ratchet catch, with the shaft A.

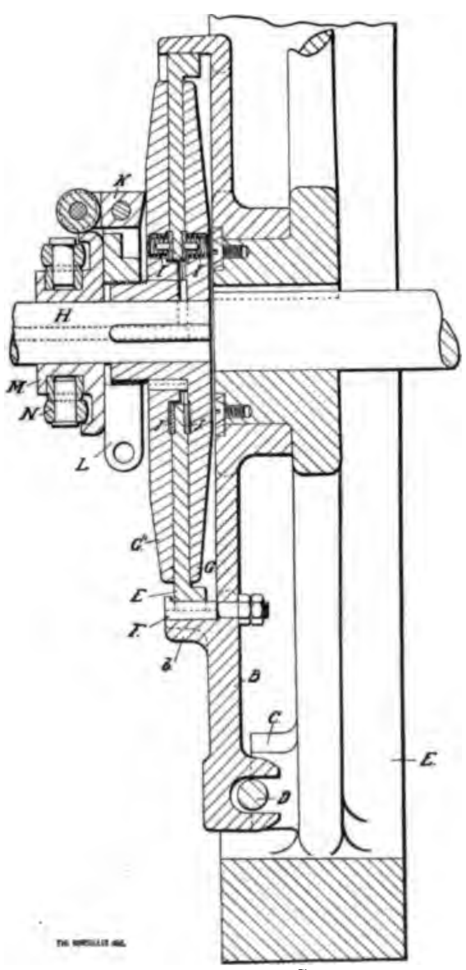


FIG. 1—FRICTION CLUTCH.

We would call attention to the provisions for lubricating the four bearings in the crank case. The case has a sheet metal cover, upon the removal of which all parts of the gear can be inspected.

Fig. 3 is a top view of the gear case with the cover removed and with a part cut away to show a section through the reversing pinions. This drawing is intended especially to show the gear operating mechanism. It will be observed that to reverse a pair of intermediate pinions R R' are provided, formed integrally and mounted on a shaft having a bearing in the wall of the gear case at one end and in a lug projecting inward from the gear case wall on the other end. The gears are bronze bushed and run free on the shaft, but are held thereon against lateral motion between a collar and a nut. The shaft can be shifted lengthwise in its bearings and thereby the intermediate pinions R R' brought into mesh with the pinion and gear 1 respectively. The shaft of these intermediate pinions is connected to a bell crank on top of the case, which, however, is not shown in the drawing.

Referring now to the shifting mechanism, the fork F controls the slow speed pinion and the fork F' the intermediate and high speed pinions, which, as stated, are in one piece. The hubs of these forks slide on a shaft mounted in the case and the two forks are actuated by separate bell cranks K and K' pivoted on brackets extending from the gear case. The lever L for operating the friction clutch is likewise pivoted on a bracket extending from the gear case.

THE OPERATING MECHANISM.

In Fig. 4 are shown two views of the mechanism by which the various sliding gears are shifted. This mechanism comprises a single hand lever A, which is pivoted on a stud B, on which it can be slid lengthwise. This lever works on a "gridiron" C, the opening in which corresponds approximately to a letter H. By shifting the hand lever along its pivot it can be brought into engagement with either of three shifting rods, D, E and F, the engagement being effected by means of pins G, H and J on these three shifting rods respectively and a socket in the lever in which these pins fit. J is a shaft, which is rocked in its bearings by the clutch operating mechanism and which carries a cam

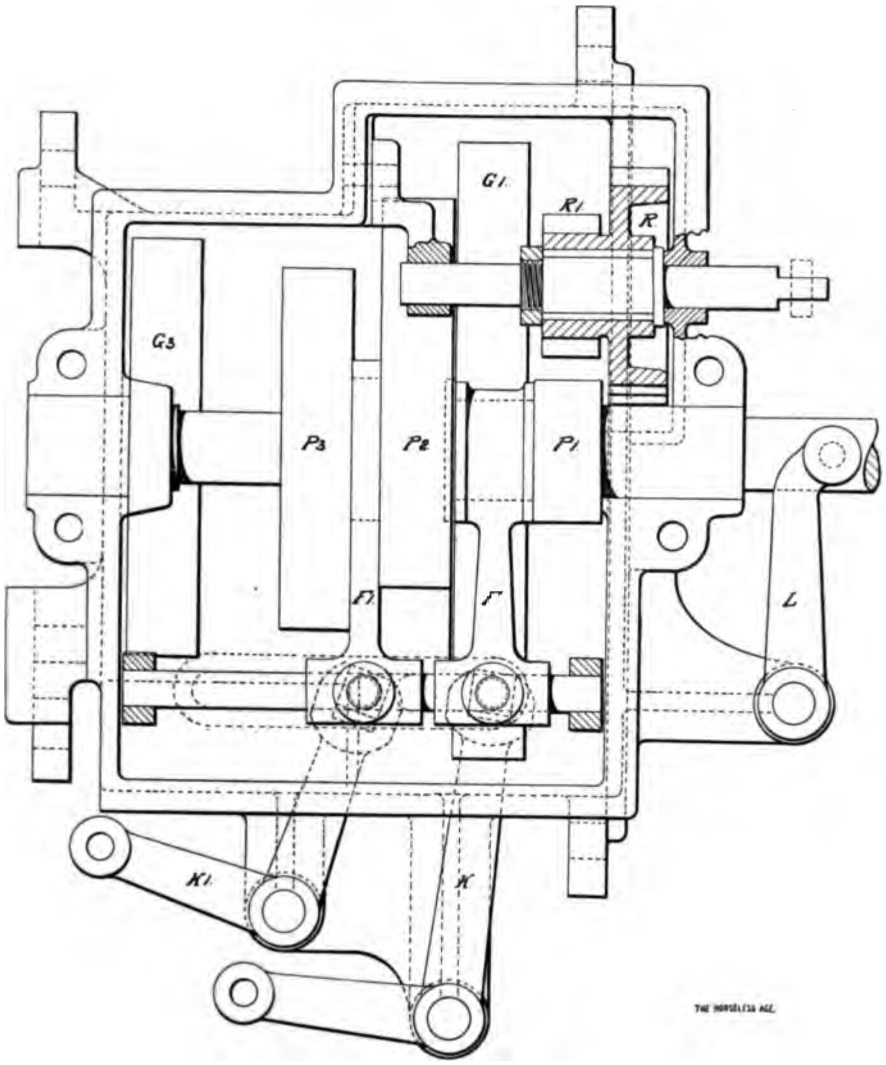


FIG. 3.

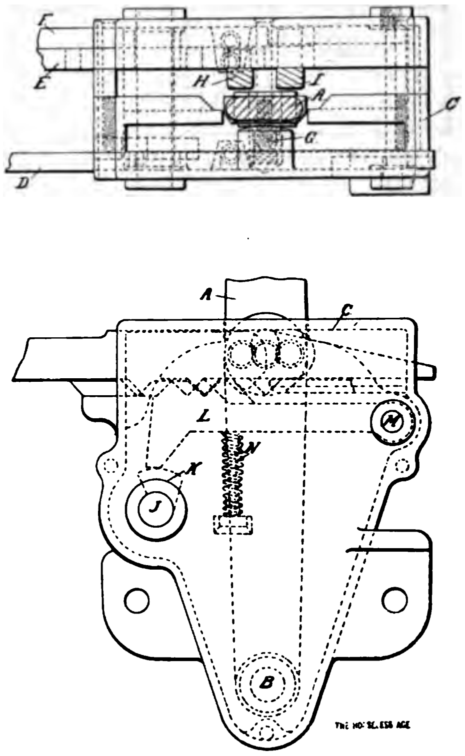


FIG. 4.

K. With this cam co-operates a lever L, pivoted at M. This lever is provided on its upper side with triangular teeth, which engage with corresponding teeth on the lower side of the various shifting rods. These teeth are normally held in mesh by a coiled spring N, but when any one of the shifting rods is shifted the spring is compressed and the toothed lever forced down. However, when the friction clutch is in engagement the cam K locks the lever L and it is impossible to shift the shifting rods and the gears.

The shifting rod D controls both the high and intermediate speed gears; that is, it is connected with the bell crank K' in Fig. 3. The shifting rod E controls the reverse pinions and the shifting rod F the slow forward speed. The latter is therefore connected with the bell crank K in Fig. 3.

The operation of the gear is as follows:

In Fig. 2 the high speed gear is shown engaged with its mate on the sprocket shaft. A single movement of the gear shift lever would disengage this pair and bring the smaller gear into mesh with an intermediate gear on the lower shaft. In order to change to the low speed ahead the shift lever must be moved to a neutral position, then sideways until it engages with the lever operating the smallest pinion on the upper shaft.

A forward movement will now bring this low speed forward into mesh by shifting the smallest pinion to the left. By returning this lever again to the neutral position it can be brought into engagement with the lever connected by bell cranks with the reverse, and a rearward movement would engage the backing gear through the smallest pinion on the engine shaft and the two couple gears, shown in Fig. 3, to the largest spur gear on the sprocket shaft. The gear shifting lever when out of engagement rests between the two slots in the "gridiron" of the lever case, and must be moved sideways into either one of these slots in order to engage the gear desired. The outside or right hand slot brings a hole in the gear shifting lever on a pin on a rod to the bell crank operating the high and intermediate speeds. A forward movement throws in the high speed and a rearward movement throws in the intermediate speed. Returning to the neutral from either extreme of the slot throws either gear out of mesh. The left hand slot carries two pins, one for the low speed ahead and the other for the reverse, which are operated substantially as the higher speeds, except that instead of one continuous movement from the rearward position to the forward it is necessary to bring the reverse to its neutral position, shifting the lever slightly sideways and carrying it forward until it engages with the forward pin, and then bring the low speed ahead into mesh.

The explanation of the operations may seem complicated, but in reality the device is said to be very simply used. For instance, in traveling with the high speed gears in mesh it is possible, by means of the throttle and foot brake, to slow the carriage and bring it to a stop. The lever would have been in the forward end of the right hand slot for the highest speed ahead. By bringing this back to the neutral position there would be no gears whatever in mesh and the gear lever could be carried into the left hand slot into engagement with the pin operating the reverse gear, and the carriage could then be backed up without the necessity of passing through any of the intermediate gears.

A story comes from Denver about a man, a maid and an automobile. It seems that the bold man sprang into a motor carriage occupied by the maid, seized the steering bar, assumed control of the machine and maid, became captain of the ship, as it were (a sort of automobile piracy), and in three minutes and 'steen seconds had secured the consent of his prisoner to allow him to steer her auto through life. Not at all bad for the dog days.

LESSONS OF THE ∴ ROAD ∴

Our Celebration.

By Charles E. Duryea.

The Fourth of July on Friday brought three days without work together. Mother and sister wished to visit Gettysburg and Hagerstown. A surrey just assembled needed testing out and we were all anxious for an outing, so with this happy combination, we, five adults and two good sized children, decided to drive to Hagerstown via Lancaster, York and Gettysburg, starting Thursday noon and reaching Hagerstown Saturday evening, returning by the most direct road on Monday—to have an endurance run of our own, with the young ladies acting as official observers.

When the surrey came out of the shop it had wheels and ironwork primed with a pale red, fenders pearl gray, while the body rough stuff coats were dirty dark brown. This combination, with the unpainted copper tanks, was not pleasing to the eye, nor were the bare seats without upholstering suggestive of comfort; while a disagreeable knock in the motor, that did not show on the testing stand, suggested possibilities of roadside worries, not conducive to rapid progress. Some temporary backs and some old discarded cushions took the place of the upholstering, while some storm aprons of rubber, more or less damaged and of wrong size, with umbrellas, were gathered together for protection against the weather.

The mechanical part of the vehicle, however, was complete except the unfindable knock in the motor mentioned and the fact that balance gear pinions of cast brass were fitted because the steel ones intended for this service had not yet arrived. Knowing the possibility of trouble with the brass pinions, a full set of four extra ones were put in the tool box, but, as experience proved, even they were not a sufficient precaution against the strains of the road to be encountered.

Thursday began by raining all forenoon, but the sun appeared at noon and at intervals thereafter, while Old Probabilities prophesied "threatening, followed by cooler weather." We therefore got together our necessities, including a camera, and started about 3 o'clock. A convenient coal scale looked tempting, so we pulled in and found that the entire vehicle and occupants weighed 2,210 pounds—a long ton. We backed off the scale and started over the bridge leading out of the city, quite merry, only to note that the sun was obscured and rain beginning to fall. The quickened pace, the scramble for umbrellas and the loud boom of a burst tire (second hand, used for testing purposes), came quickly together and we pulled up under a railroad bridge for shelter, only to find that the bridge was an open one and worse than useless. We sat this shower through, however, and when it slackened sent the passengers to a nearby porch while the vehicle was run on to a side street and the factory telephoned for another tire. Before this reached us, rain again fell in torrents and for two hours we waited, after which the rain ceased, the tire was replaced with another and we drove back home, closing the first chapter. Robin Damon would say, "So it goes with automobiles."

Friday morning bright and early found us awake. No small boys in the neighborhood seemed so eager to celebrate the Fourth as we, and we woke up our street by shooting a giant cracker and starting out at 5:30. A stop at the post office, to buy a morning paper and for a scary horse, completed our record to Shillington, by which time the motor was knocking badly, so a stop of eight minutes to hunt the cause was made, but without avail. One stop for a scary horse, another for a herd of cattle and Gouglersville was passed. Another scary horse took three minutes, and while in this locality we passed a house bearing date of 1767—truly an old landmark.

The roads from Shillington to Adamstown are quite hilly and although mostly hard were badly guttered by the rain. Adamstown, 12 miles from home, was reached at 7:07 o'clock, and here we stopped for one hour for breakfast at the Lancaster County House, a substantial farmer's meal being set out for us. Another scary horse shortly after this and slightly better roads were the incidents to Beamstown, 4 miles in twenty-five minutes.

Passing this we were stopped by a team of mules, and later by a horse and shortly after by another horse hitched by the roadside. Several men were working at the opposite side and one of them ran over to the horse. This added to, rather than allayed, the horse's fright, so he reared and attempted to break away from the fence where hitched. The man became frightened, let go of the horse and stood back waiting for something to happen. The halter held, however, and another man, evidently the owner, started for the horse, exclaiming: "That man's a fool!" He proceeded to untie the horse and quiet him, while we started again and drove slowly by, making practically no noise and producing no effect on the horse. The quick rush and evident fright of the first man were more to blame for the horse's behavior than our vehicle.

We reached Ephrata at 9 o'clock, having made another stop for a team. Our motor by this time was well warmed up and the knock which had been apparent on every hard pull since very shortly after starting became quite pronounced on a long hill, so after stopping for a team we spent five minutes trying to find out what was the matter. The search resulted in nothing, however, except that the oil cups were adjusted to feed a little faster. Although the sun was now quite hot and the road severe, the water was not boiling violently and we wondered if the supply was sufficient for proper circulation; so at Akron, our next village, we pulled up to the hotel, where a large pump and pail were in evidence, and put in two or three half pails of water, filling the tank, making it evident that lack of water was not the trouble. We were soon away over a level road as slippery and muddy as the New York roads of the endurance run route, and although provided with ample mudguards enough mud came into the vehicle to convince the girls that they could make mud pies with the mud on their clothing. A little click in the neighborhood of the chain asked for investigation, so a stop was made for this purpose and the chain screw nut was found loose. This stop was made under a shady tree as we started up a hill, and one of the girls

On Culp's Hill.

kept her foot on the brake while the operator made repairs. The motor was again started and pulled the hill nicely, although seeming to labor, so the remark was made that the hill must be a steep one, when it occurred to the fair assistant that her foot was on the brake, evidently not very firmly. After this discovery the vehicle ran better.

Over the top we went and down the other side at a lively pace, the relief from the level muddy section impelling us to drive faster. In the valley stood a little pool of water, seemingly but an inch deep, and into this we went without slackened speed, only to have the wheels drop nearly to the axles, giving us a bump that almost threw us out of the vehicle and warning us to be more cautious in future. Shortly after this we passed Oregon and a little beyond a toll gate, but nobody being in sight we did not stop until compelled to do so by a scary horse a little farther on. The road, being a toll road, improved and our speed became faster, so that our motor began to knock again and required inspection. At the next toll gate, 3 miles from Lancaster, we stopped for this purpose. Toll was 5 cents to Lancaster, but before reaching Lancaster we had to pass another toll gate, where 4 cents more was demanded. We reached Lancaster at 10:45 and saw a steam surrey crossing our path; many people were in evidence, because of the Fourth of July celebration about to begin. This city has some good streets and many pretty residences. We circled about the main portion of the town and then headed westward toward Columbia a little after 11; toll 34 cents for 10 miles. At Mountville the band was waiting for a street car and passing the time by playing a short selection, but stopped abruptly on our appearance. The pike is paralleled by street railways lines and is in good condition, so that 12 to 15 miles per hour with our heavy load was easily made. We reached Columbia without a stop, except for toll gates, in three-quarters of an hour and drove down to the ferry, expecting to cross the Susquehanna by this means.

While waiting for the boat to come from the other side we were advised that the railroad bridge was also a wagon bridge and to this we retraced our way. Here we were obliged to wait twelve minutes for a train to pass, during which time we filled up the water tank, although not empty. This bridge is a mile and a quarter long and there are no restrictions as to speed, the railroad company preferring people to get out of the way as quickly as possible. So we opened the throttle and drifted along as rapidly as the occasional high planks would permit with comfort, making the distance in less than three minutes, or more than 25 miles per hour, which we considered quite creditable, considering the heavy load. This brought us into Wrightsville, where we stopped at a restaurant for dinner. While the passengers were washing the operator sought for gasoline at a nearby hardware store and found two gallons, which were taken as a precaution against possible shortage before a further supply could be had, everything being closed on the afternoon of the Fourth. These two gallons were evidently half kerosene, for an attempt to wash off some grease that afternoon left the hands almost as greasy as before. The large supply in the tank, however, was not sufficiently deteriorated by the kerosene to be objectionable and no appreciable difference resulted.

Shortly after 1 o'clock we again started; toll, 21 cents for 10 miles. The road was still good and we went along merrily until we met a horse hitched to a single buggy containing a man with a girl and boy, about twelve and nine years of age. Almost before we could think, the man had fallen out of the buggy, dropped one line and by pulling on the other had swung the horse half way around in the road. The children immediately climbed out and ran to the fence while the man got up and seized the horse, which, however, was not frightened. By this time the girl had gotten down from the fence, run to the rear end of the buggy and taken out a small child about five years of age who was sitting on the floor of the buggy behind the seat. We laughed gently, advised the man to lead the horse past us and then started again, with a merry appreciation of the troubles of a horse driver, particularly when the man is more scared than the horse.

About this time we heard a click, but thinking that a pebble had been thrown by a tire we did not stop to examine and a few minutes later our chain ran off. Here we stopped twenty-two minutes to replace it and found that two teeth from a balance gear pinion had broken out, one of them causing the chain trouble. Had we examined at the first click we probably would not have had this. In running off, the chain had bent the distance rod and this should have been straightened, but the road was good and the sun hot, so we simply replaced the chain and started on, a few minutes later being stopped by a broken chain, evidently due to the bent distance rod. We therefore unloaded the passengers, shade being plentiful at this point, and proceeded to make repairs. The rubber aprons were spread on the ground, the cushions piled on them and the party generally made comfortable while repairs were in progress. Two hours and a half were spent fixing the chain, removing the distance rod and pounding it with a stone for a hammer, using two or three stones in the roadway for an anvil, as well as removing the broken balance gear pinion and replacing it with an extra one brought for the purpose as stated before. The girls visited with the toll gate keeper's family nearby and carried good cold well water to the thirsty. Being in the shade the experience was not unpleasant, while the relief from sitting in a wagon since morning was also grateful.

We got going about 4:30, and shortly after met a steam runabout headed toward Lancaster. Down this way automobiles have evidently been in the habit of driving through without stopping, for each toll gate bore a sign: "Automobiles stop and pay." We first thought this a reflection on the honesty of automobilists, but as the toll road became poorer we finally decided that they were not to be blamed if they didn't stop. Here, too, it became evident that toll gate keepers evidently needed to watch each other, for at one gate we would pay and get a ticket to be handed to another less than a mile farther on.

We reached York a few minutes before 5 o'clock and stopped to write a postal card. Leaving York the toll was 9 cents and a small boy plaintively implored: "Take me along." Here we met a horseback rider whose animal did a Wild West stunt, but nothing happened. Along here we encountered some deep gutters crossing an otherwise fair road. At 5:30 a firecracker report announced trouble with a rear tire and we stopped in a narrow strip of road on the sunny side of an orchard to find that our tire had burst at a rim cut. Being detachable it was quickly removed and an extra tube inserted, after which the tire was wrapped carefully with a string, then with tire tape, to protect the string from wearing. This was done at two other places that looked dangerous, the whole transaction taking about an hour in a boiling sun with no mitigating breeze or other circumstances. The passengers had umbrellas and fared better. While standing here a buggy overtook us and handed out a hub cap that we had lost some distance back; a fact we had not noticed until they called our attention to it.

A little later we met a large wagon drawn by three horses and two mules and were obliged to stop until they got by. At Myers we decided to pump the repaired tire a little harder and spent three minutes doing this; toll here, 9 cents. A little later we stopped for a scary team and at Thomasville five minutes to send a telegram. At the next crossroad a scary horse again caused a stop, and as it was time for supper we began to inquire where accommodations could be had and were advised that a hotel would be found at Farmers, 4 miles farther, which point we soon reached, a little after 7 o'clock. We found this to be a small roadside inn with bar, the latter being its principal source of revenue undoubtedly. The place looked favorable, and we decided to risk supper, even though we went farther for lodgings. We were cheerfully made at home, and after washing were given comfortable chairs on a cool porch, while the children amused themselves with the parrot and the squirrel in the large yard sur-

rounding the house. The supper was clean, well cooked, excellent quality and ample in quantity; the fresh milk, fresh eggs and home made delicacies proved very appetizing, so the whole party were in favor of stopping all night. The surrey was run into a convenient shed and the fireworks, carried by the children all day, were set off at last, to their great satisfaction. The hot night was much tempered by the cool breeze found at this excellent location, the inn being situated at the top of a hill; and morning, with the noise of the chickens and the birds, came much too soon.

We had breakfast at 6:30 and were ready to start shortly after 7. The vehicle had been driven up in front, while passengers and baggage were loaded, during which time a horseback rider had appeared. He sat sidewise upon his horse, either ignoring or unconscious of us, and paid no attention when we and one or two others warned him that we were about to start, so we turned the crank and both our motor and his horse moved, the latter so rapidly that he dismounted backward. Being no novice, however, he landed on his feet and held to his horse while we drove away. We stopped for toll (8 cents) and for a horse before we reached Abbottstown, 4 miles. Here we stopped three minutes to inquire the way to Gettysburg and then proceeded to New Oxford. The roads from Farmers to Gettysburg are badly kept, although of stone, and on this account the drive was exceedingly rough. At New Oxford we heard a suspicious snap and decided that a balance pinion had broken, so drove under a shady tree on the edge of the town and stopped half an hour to take out the broken pieces. A nearby well furnished refreshments, and after paying toll, 17 cents for 6 miles, we started on.

Shortly after passing Guldins we stopped again to take out a broken pinion tooth, and twenty minutes later, in spite of our watchfulness, another pinion broke, taking the chain with it. Here we spent an hour putting in new pinions and replacing the chain, the sun boiling down in a most unpleasant manner, although most of the party sought the shade of some nearby willows. A little gully furnished water for washing after repairs were made, and we were again moving towards Gettysburg, 4 miles away. Just before entering the city the last toll gate demanded toll, 9 cents, although we had been assured that our previous payments carried us into the city.

We were next stopped for a scary horse and arrived at Gettysburg at 11 o'clock. Since it was not yet time for dinner we stopped at the express office and found our tire telegraphed for at Thomasville; then drove out to Seminary Ridge and Barlow Knoll, the scenes of the first day's battle, getting back before 1 o'clock, and

On Little Round Top.

proceeding to a restaurant for dinner. While the party washed the vehicle was driven to a blacksmith shop, where a bar of iron and a sledge were obtained with which to properly straighten the distance rod bent beyond York and again bent further by the broken pinion before reaching Gettysburg. This equipment put the distance rod in good condition and we hoped by careful watching to prevent further troubles from the chain. A convenient hose in the hotel stable was accepted for filling the water tank, and a resident interested in automobiles, with a view to purchasing, kindly went with us to a hardware store where gasoline could be obtained. This seemed to be of proper quality and 5 gallons were put into the tank. The last measure, however, contained something that was thrown out, and inquiry developed the fact that it was water, while the next measure was nearly half water and was, of course, rejected. The probability, therefore—nay, the certainty—was that water had been emptied into the tank in some unknown amount and trouble was to be expected within a half block. This was mentioned to the guide and it came as predicted. The drain cock was opened, permitting water and gasoline to run out; the bottom of the float chamber was removed so as to drop out some more, and by these methods we were enabled to get going, although the presence of water manifested itself frequently for some time thereafter.

After dinner we drove to Culp's Hill, following the magnificent boulevards that traverse the scenes of the second and third days' battles. On Culp's Hill we sat for a photograph, the little girl pressing the bulb. We then spent some time in the National Cemetery and wound our way toward the Round Tops, but before reaching there we were startled by seeing a woman driving a single horse to a top buggy stop and fall out of the buggy. We stopped and went to her assistance. Her horse was not scared, but she was badly excited and the front of her best dress was torn. The horse was led past the vehicle without fright or difficulty, while she walked up and explained that she was very nervous and that at one time an automobile had rushed past her, badly scaring her horse, which explained her fright. The comicalness of the situation was further magnified by the fact that a large market basket full of fresh eggs occupied one side of the floor of the buggy, so that an upset vehicle might have suggested scrambled eggs.

On Little Round Top we dismounted to climb among the rocks for better views and here took another picture. The beautiful drive across the valley and on to Seminary Ridge again was much enjoyed as the shadows lengthened, and by 5:30 we were back in Gettysburg for supper. Here the ladies bought souvenirs, wrote postal cards and generally amused themselves, while we decided that having started a half day late and having troubles with our balance gear pinions, it would be better to give up Hagerstown and return toward Reading by the way of Harrisburg. We therefore took mother and sister to the railroad station at train time, and bidding them as pleasant a journey by rail as by automobile, we drove northward over the Harrisburg road, stopping at the express office to secure the extra tire mentioned.

(To be continued.)

BEGINNERS PAGE.

The General Arrangement of the Parts in Gasoline Carriages.

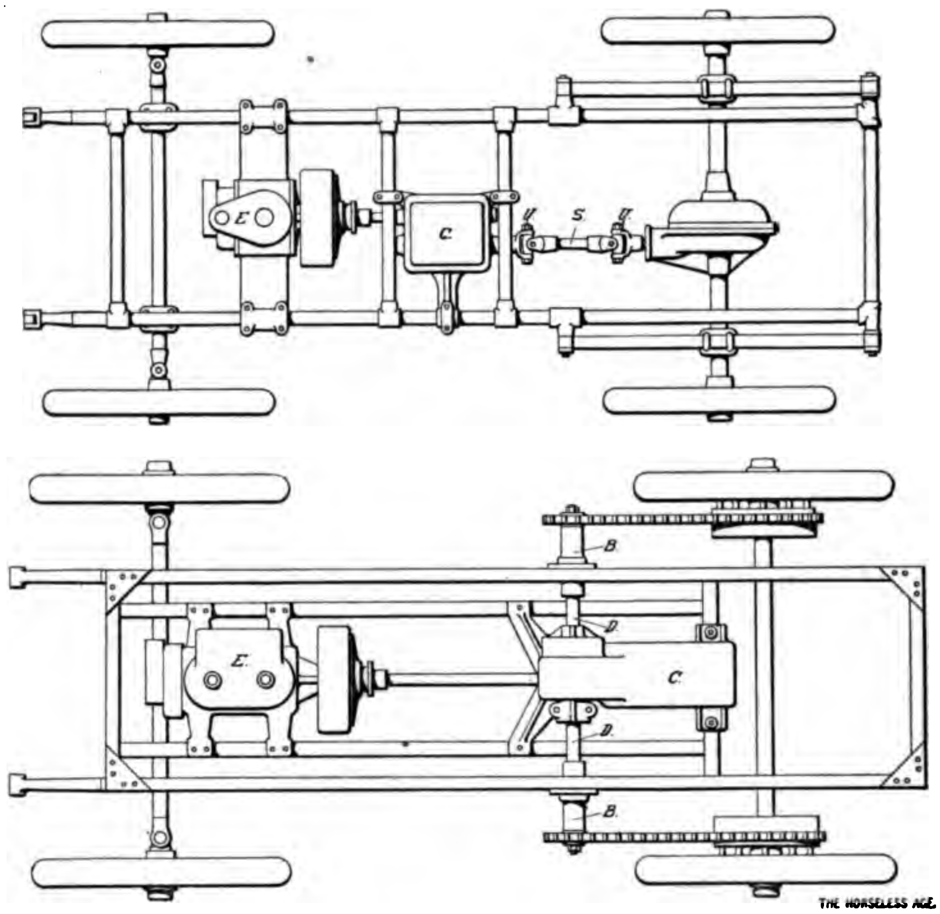
The arrangement of the parts in a gasoline carriage varies, of course, more or less with each individual manufacturer, but a number of general designs relating to the location of motor and transmission gear and the transmission from the gear to the driving wheels have been adopted by a large number of manufacturers, both here and abroad, and therefore in a certain sense become standards. We shall only describe such designs in this article.

It may be mentioned here that with very few exceptions the motor and its appurtenances and the change gear are supported on a frame resting on carriage springs, the object being to relieve the mechanism of the shocks to which it would be subjected if it was not spring supported, and also to protect the axles, wheels and tires. This necessitates there being some flexible transmission device between the change gearing and the rear axle, or the rear wheels, to compensate for the play of the springs. This transmission device consists either of block or roller chains, of which either one or two may be used, according to whether the two rear wheels are mounted on a revolving axle or whether they revolve on a stationary axle, or of a jointed shaft and bevel gearing. In the case of chain transmission the distance between the rear axle and the shaft on which the chain sprocket is mounted is maintained constant by means of adjustable distance rods or chain tightening rods.

Fig. 1 represents the general type of light French carriage. It has a tubular frame supported on semi-elliptic springs in front and rear. The vertical engine E, generally of the single cylinder type, is arranged in front, being bolted to the main frame, as shown, and covered by a sheet steel bonnet when the body is in position. The transmission gear is located somewhat to the rear of the engine, the case C being clamped to the main frame tubes, to cross tubes or to both. The gear is always of the "shifting" variety.

The rear axle is a live axle, and is provided with a differential gear near its middle. Upon the differential gear is mounted a bevel gear crown with which meshes a bevel gear pinion, the shaft of which has a bearing in the casing enclosing the differential and driving gears. This shaft is connected to the secondary shaft of the variable speed gear by a short shaft S, with universal joints U U at its two ends. This driving arrangement is referred to either as a chainless drive, a bevel gear drive or (in French) as a transmission à la cordan.

Fig. 2 shows the arrangement of parts



FIGS 1 AND 2.

commonly found in the heavier French automobiles, and often referred to as the Panhard system. The frame is built up of wood, reinforced with flat steel, and is supported on four semi-elliptic springs. The motor, a multiple cylinder vertical one, is located in front, and the change gear box in the middle or toward the rear of the frame. In these larger vehicles, as the frames are wider, the motor and gear case are usually not fastened to the main frame bars, but to an auxiliary frame, which in turn is fastened to the main frame. A countershaft D passes through the gear case near one end, and is driven from one of the change gear shafts by bevel gears. Frequently the change gears are located in front of the countershaft, but in some cases they are arranged as shown in the drawing—i. e., to the rear of the countershaft. The countershaft is supported at its ends in bearings B B fastened to the main frame bars. It carries the differential gear at or near its middle, within the gear casing, and at either end a chain sprocket pinion. Two driving chains connect from these sprockets to larger sprocket wheels on the two driving wheels. The sprockets on the rear wheels are usually formed integral with brake drums.

Fig. 3 represents a general type which has been adopted by a number of American manufacturers. The frame is differently constructed, but the engine is always a single cylinder horizontal one and

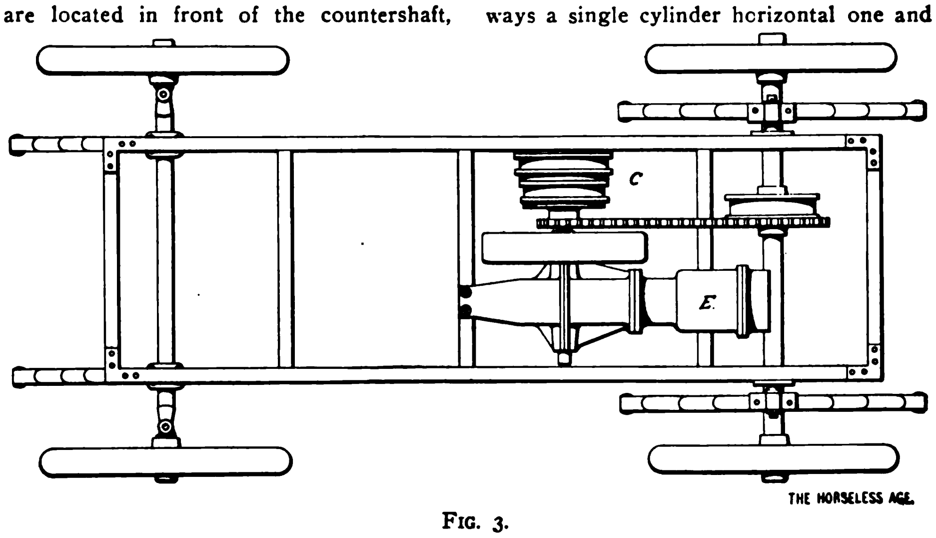


FIG. 3.

is arranged at the rear on one side of the frame. The change gear is mounted upon an extension of the engine shaft, on the opposite side of the frame, and is generally of the sun and planet type. The sprocket pinion is located between the engine and gear, at the middle of the frame, or nearly so, and a single chain transmits the power to the revolving or "live" rear axle.

Nothing can be said generally about the location of the minor parts of the power equipment, such as the gasoline and water tanks, the muffler, etc.

This brings us to the end of the series on gasoline automobiles and it is supposed that anyone who has read this series carefully will have no difficulty in readily understanding the construction and mode of operation of any particular type of machine. In our next issue the series on the steam carriage will be begun.

...COMMUNICATIONS...

Skidding.

NEW YORK, August 11.

Editor HORSELESS AGE:

In your issue of August 6 C. E. Duryea raises objections to a detached sentence, on the subject of skidding, in my recent article relating to "The Causes of Automobile Accidents." The objectionable sentence was: "The tendency to skid is aggravated by uneven distribution of the load." As I do not believe true conceptions of automobile matters—or any other complicated things—are best reached by controversy or quibbling on words, I shall not attempt to show the fallacy of anything Mr. Duryea subsequently says on the subject, especially as I think he is right in the main contention—that front wheels should be lightly loaded. In speaking of "uneven distribution of the load" I referred to lateral distribution, as when the right rear wheel, for example, is loaded much heavier than the left rear wheel. As my article was intended to throw light on accidents, the subject of skidding was merely incidental, and I made no attempt at analyzing it exhaustively; in fact, I took it for granted that the readers would supplement many of the statements, which were too brief for accuracy, by their own knowledge. Unless this plan is followed no large subject can be handled in the automobile press. Possibly Mr. Duryea thinks it practicable to teach the world all he knows by direct precept. His closing sentence, "These three points cover the skidding question in a nutshell," would lead one to suppose that such is his standpoint. The writer takes a different standpoint. He merely wants to agitate ideas and make people think. Whether they consider him right or wrong does not matter so much. That is only a question of personal vanity.

I would suggest to Mr. Duryea that he refrain from compelling others to take up their pens in rebuttal—wasting valuable space and the time of readers—and that he write on his subject instead of on the supposed ideas or beliefs of others on that subject. His article on skidding, for example, would have been just as readable and useful without mention of my name, and, furthermore, if he had not found fault with my unpretentious remark on load distribution, he would not have disclosed so plainly that the question of lateral distribution has escaped his attention.

I hope someone may find time to write an enlightening article on another factor in skidding which failed to find room in Mr. Duryea's "nutshell," namely, "the peculiar action of differential gears when ground adhesion is insufficient."

MARIUS KRARUP.

Fishing a Cure for "Automobiliousness."

Editor HORSELESS AGE:

As a constant reader of the leading automobile journals of the day and a gatherer of sentiment upon the subject, as voiced in the columns of your esteemed paper particularly, it has occurred to me that a "turning point" has been reached—the supreme climax, the height (or the depth as may be) of pessimism, otherwise biliousness. Let us have more of the rosy, bright side of this sport set forth, and a premium offered for the versatility which can best depict it in all its pristine glory.

The man who can get a few miles from home with his automobile and cannot get back, and the fellow who owns the "worst automobile" made by the "deceptive manufacturer" have been heard from exhaustively. The machine which some men can go out and get home in is not yet built, and there are no manufacturers in the business who can yet build a machine to suit some other people.

There seem to be three grades of automobiles now manufactured, which can be termed, first, good ones; second, medium ones, and third, "high grade." Now, it seems logical to conclude that if our bilious friends cannot have any fun with "high grade" machines, while the other fellow has lots of fun with the poorer machine, the latter is either naturally a better automobilist or his liver is in better working order. Is the automobile life worth the living " depends upon the liver," and there must be some automobile curative to overcome this conspicuous disease. Especially must it not become too prominent in the automobile literature of this the twentieth century. With a proper application of this curative not only will the liver live to be glad he has a liver but the turning point in the happiness of automobile mankind will be reached, as well as the disease in the ranks of the bilious due to reading the results of the depredation of the disease.

"Go a-fishing" with your automobile. This remedy—simple, easily obtainable and efficient—will enable one to get his machine home (to show his fish), and make him bless the manufacturer, however "deceptive," who could make any kind of an automobile to give such a combination of fun and diversion as, for instance, a 50 mile run on shore, combined with a 50 mile sail on the ocean, to Catalina Island and a return cargo of a 270 pound deep sea bass—caught with a 16 ounce rod, 24 strand line—and taking one hour and forty-five minutes of the finest sport to conquer. My fish could not be measured by the hands outstretched (the usual "fish story"), but by feet, it being a veritable whale! This same medicine will work off all biliousness—be it a big fish or a little fish—and the fellow who has such desperate success in running an automobile might succeed in fishing. In making the attempt he might improve his liver. If happiness depends upon the liver perhaps one cannot learn to get the true fun out of an automobile until his liver is more nearly right than the present automobiles and the "deceptive manufacturers." Of course, all do not have the delicious cool summer of sunshiny California, the big fish, the oiled, dustless roads and the cool Pacific trade winds, to make the liver or the automobile work just right. This magic island Catalina is 24 miles out in the Pacific, off Los Angeles. It looms up as one approaches like a monstrous whale, but assumes the mountainous shapes when nearer. Its peaks are several hundred feet above sea level. It is 25 miles long, and has 60 miles of shore and 55,000 acres surface. It is a summer isle even in winter, and has an ideal California climate, the noon temperature of August averaging 72° and of December 67°. Its marine gardens, seen through glass bottomed boats, are filled with its extensive flora, gold fish, electric fish and the larger monsters which inhabit it, and one can spend weeks in exploring and be constantly entertained. The water is so clear that objects 75 feet deep can be plainly seen.

Should one tire of fishing and still feel bilious thereafter he can try goat hunting. Many sportsmen bring in huge goats by the half dozen, and there are hundreds obtainable in short trips on this magic island. Leaving it now we return to shore, and taking our automobile at San Pedro we make a fine run to Pasadena, satisfied that it alone, without the fishing, ought to cure all biliousness except chronic cases.

LINCOLN C. CUMMINGS.

A report has it that the "Maison Fournier" in Paris, of which Henri Fournier is the head, will control nearly the entire output of the Mercédès concern for 1903 and the entire output for 1904.

Questionable Business Methods.

Editor HORSELESS AGE:

In the interest of your readers I think it right that I should give my experience with a party who has frequently advertised in your "For Sale" column, which, by the way, is one of the most valuable features of the many good ones of THE HORSELESS AGE. In the issue of April 30 I read an advertisement of "The Horton Engine Works Company, Saginaw, Mich.," offering a bicycle motor, complete with accessories. As I had seen the name of the concern in the column before, I wrote for further particulars. A photograph was sent me of the motor mounted on a bicycle; it was represented to be one made by a manufacturing company that has frequently advertised this as its specialty in your journal. In fact, the photograph sent was, I knew, a correct representation of the bicycle motor of the firm indicated.

The letter was written on a sheet which bore the imprint of "the Horton Engine Works Company," and the writer guaranteed the motor in every respect. I wrote in reply asking a few other questions; his answer was prompt. Then I sent the money for it, with instructions to forward by express. Instead I received a letter stating that the motor had been shipped and sold, but that, "in order that you may not be disappointed, we have decided to send you one of our own make—a much better one." I answered at once that I did not want that, and requested that my money be returned, since the motor I tried to buy had been disposed of. My reply was a letter saying "We have just received another —— motor, which we will at once get ready and ship to you." The motor named was the one I had at first contracted for.

In a week I received by express a box weighing over 100 pounds, requiring the efforts of two men to take it from the express wagon. It contained some kind of stationary engine, weighing about 90 pounds, a heavy muffler and a large sheet iron tank, nearly the size of a quarter section of a flour barrel. I wrote to the "Horton Engine Works Company," or rather Edward Horton, whose name was on one of the envelopes, that this was either intended for someone else or that it was an imposition. At any rate, I demanded the return of the money he had received from me, in default of which I would place the matter in the hands of legal advisers and expose his methods. To that I received in reply a sneering postal saying "my meaning was not clear." and intimating that I was sending "a threat through the mails." Furthermore, I was informed that this "was not the way to adjust matters." I wrote again, in order that there might not be any mistake, and went over the matter with the individual. This brought another postal, saying that I had evidently bought an engine from somebody else, and that they knew nothing about it—the tenor of the postal being entire ignorance of the transaction.

As the post office money order had been made payable to Edward Horton and all the letters and postals from "the Horton Engine Works Company" were in his own handwriting, and I had kept copies of my letters, the history of the matter was clear. I gave the papers to counsel. Through them Horton has just returned the amount paid him. The sum involved was a small one, and, being so far distant from Saginaw, the matter entailed much trouble, but I was convinced that such transactions should not be permitted to succeed unchallenged.

W. W. ARCHER.

How to Prevent Fire Accidents.

BOSTON, August 14.

Editor HORSELESS AGE:

Possibly some of your readers who are users of steam machines may be interested in the very simple device I have for putting out gasoline fires. I carry under the seat of my carriage about 10 feet of rubber hose of half inch inside diameter, fitted with a union nut which can be quickly connected with my blow-off. It would be a very bad fire that could not be almost instantly put out with a half inch jet of steam and water thrown by a pressure in the boiler of 300 pounds per square inch. A very small gasoline fire, such as one has occasionally around the main burner, can be readily puffed out with an air pump when it is too much for lung power.

Someone suggested using steam for cleaning my engine, and I accordingly tried my fire hose with great success. In three minutes one can clean the engine off more thoroughly than by two hours' hard work with rags. It is very important to immediately oil all surfaces cleaned with steam to prevent rusting.

I have my carriage insured against fire wherever it may be in the United States at a cost of 1½ per cent. per year. This is a very convenient form of policy, and many times worth the worry it saves.

Probably many users of automobiles are not aware of the fact that it is possible to buy from most makers of gasoline iron tanks of 100 gallons capacity for gasoline storage at a merely nominal cost. These tanks are used for the shipment of glycerine to this country and then sold, after being emptied. at a low figure to the gasoline refiners, from whom they may be had at around $10, according to how they are fitted with faucets.

I buried my tank in a bank, which rises near and somewhat higher than my automobile stable, and laid a line of pipe into the stable. This pipe has two valves, one inside the stable and the other just outside, and my insurance policy requires both to be kept shut except when drawing gasoline.

My stable is 15x20 feet inside, which gives just enough room in which to turn round under power the carriage which I use; 16x20 feet would be better inside dimensions for this style of carriage, and four of them could be put in such a stable if desired at any time.

In order to make the stable as near fireproof as it is possible to make a wooden stable, I had it finished off inside with adamant plaster laid on Sackett's plaster board. My carriage could burn up in the stable without damaging the building, provided the doors and window casings did not catch fire.

WALTER K. SHAW.

Valve Proportions.

READING, Pa., August 14.

Editor HORSELESS AGE:

The matter of proper valve proportions is one which, like many other matters around the motor vehicles, is best solved by experience, and it is much easier to build a theory to fit the facts after the facts are known than it is to make the facts fit the theory; so it is much easier to build a successful motor after one has gained the necessary experience than it is to build one in accordance with the theories that seem to apply.

Our own experience, for example, may be interesting on this point.

Our cylinders are 4½x4½ and our inlet valve opening is 1⅛ inches diameter, i. e., one-quarter the piston diameter. These motors have, without any tuning up or spark advancing, run up to 1,270 revolutions per minute while pushing an 800 pound phaeton with two passengers a mile in 1:40, so that they develop considerable power at this speed, which is proof that satisfactory charges of the explosive mixture are being admitted. In a flying machine motor of the same size developing 15 horse power per cylinder at 1,000 revolutions per minute, with sparks advanced a little, we find the same results, and from such instances we conclude that the inlet valves need not open more than about one-eighth their diameter, which is one-half the theoretically required opening. We can only conclude, therefore, that either the valves are larger than is necessary for a motor running at speeds below 1,300 revolutions per minute or else that other causes than the lift of the valve affect the operation thereof. We believe both reasons apply and believe that it is advantageous to use a large valve with a slight opening rather than the theoretical full opening.

We further use very light springs on the inlet valves—so light that we don't dare compare them with the formula for computing strength of spring required. Either the theory or our practice is wrong, but until we can get better results by changing the practice we will continue to ignore the theory. It is quite evident that a light spring permits the valve to open readily and decreases the resistance to the ingoing charge, while the large valve both lessens the ingoing resistance and presents a large surface to any outgoing pressure, so that the first movement of the gas toward an escape through the inlet valve promptly closes the

valve. This latter factor overcomes the need for strong springs, and I do not remember having seen any mention of it in the formulas for computing strength of inlet valve springs. From this statement you will see that the time of action of the valve does not depend upon the strength of the spring and that the valve may work without any spring whatever, a fact we have frequently proven by trial.

The danger of leakage is greater with a large valve than with a small one, because of the greater circumference of the valve seat, but since the valve has an area in proportion to its square, whereas the circumference is only proportional to its diameter, the large valve gets an increased pressure, which tends to make it seat more firmly. An irregular shaped casting may tend to warp the seat under changes of temperature and this is a slight objection to large valves.

CHAS. E. DURYEA.

Renault Used Wood Wheels.

LONDON, August 6.

Editor HORSELESS AGE:

Referring to a letter from F. G. Mott, Jr., in your issue of July 16, in reference to "Wire versus Wood Wheels" in the Paris-Vienna race, there is some mistake in Mr. Mott's statement. The Renault cars up to this race were always fitted with wire wheels, but the winning Renault car in the Paris-Vienna race had wood wheels. All the larger type carriages are invariably fitted with wood wheels. I have personally experimented with both, and while mechanically it seems that metal wheels ought to be better, in actual practice with the bigger vehicles we seem to get lighter wheels of wood and certainly very reliable ones.

S. F. EDGE.

The Holsman Vehicle in the Contest.

CHICAGO, August 5.

Editor HORSELESS AGE:

The Holsman Automobile Works on the day before the Chicago 100 mile contest was to have taken place, on July 12, entered with the intention of going over the course with their trial vehicle, which had already run about 800 miles over all kinds of roads. We entered because the country roads were not in good condition, and were sorry the postponement was made.

Our vehicle, which was made up of hit and miss parts, as might be expected in a vehicle that is being altered and realtered and experimented with, created quite a little merriment among the manufacturers of finished vehicles on account of its peculiar makeup of patched and partly unpainted body and running gears. Unfortunately our vehicle made a stop about 25 miles out on account of loose packing in one of the spark plugs of one of the cylinders, and when 42 miles out a pin holding the exhaust cam sheared off. In order to continue the drive the driver was compelled to walk back a mile and a half to Libertyville and get a drill. He stopped a passing contestant and asked him to report at the next control that he was out of the contest, and after three and one-fourth hours continued on the course, making the balance of the distance with only one voluntary stop of forty-five minutes for dinner. He drove 2 miles out of the way and passed the Chicago Automobile Clubhouse on his way home two minutes before his maximum time expired.

HENRY K. HOLSMAN.

Invention to Prevent Skidding.

NEW YORK, August 14.

Editor HORSELESS AGE:

Seeing an article on the subject of skidding in a recent issue of your paper, I beg to draw your attention to a device which was recently patented by me which I confidently expect will take care of this trouble. The device was mentioned in your review of patents, and its principal duty consists in stopping the action of the differential gear in a manner which will not endanger the automobile in case the apparatus is abused. There is also an automatic feature in this device which I think can be used to great advantage on heavy cars when traveling at high rates of speed on slippery roads. The principle on which this device works is that the inertia of a revolving loose wheel locks the differential in case of a sudden variation of the speed of the car, and, as it is of great simplicity, I should be glad to see the device tested on a heavy touring carriage.

ARTHUR HERSCHMANN.

The Next Paris Show.

(Translation.)

PARIS, August 8.

Editor HORSELESS AGE:

The annual exhibition of automobiles, cycles and sporting goods has now definitely become one of the most brilliant of Parisian events. It has become a place of rendezvous for all persons of eminence and for the fashionable world, drawing from the whole world the adepts of the new locomotion, who go there for purposes of study or with a desire to purchase.

True to its traditions, the Automobile Club of France, with the co-operation of the "Chambres Syndicales" and the "Syndicats" of this industry, is now organizing its fifth international exhibition, to be held at the Grand Palais of the Champs Elysées December 10 to 25, 1902, which will in no wise be behind the exhibition of last year, the brilliant success of which none of us have forgotten.

Officially inaugurated by the President of the Republic, accompanied by the Minister of Commerce, and visited successively by the entire Cabinet, it was also honored by the visit of His Majesty Leopold II, who came to Paris especially for the occasion.

The considerable number of the exhibitors, the importance and the variety of the products shown at the stands, the elegant decoration of the latter and the multiplicity of sales effected during the period of the show rendered it a veritable triumph.

The Automobile Club attributes to the constantly growing success of its exhibitions the incessant progress of these still comparatively new branches of our national activity. It will therefore concentrate all its efforts to accentuate in 1902 the onward march of the previous exhibitions, certain that it will thus accomplish a truly patriotic work.

In view of these considerations, the import of which will be apparent, we hope you will accord us your valued co-operation.

G. RIVES,
President of the Committee of Organization, General Commissioner.

The Motor Bicycle Contest.

Editor HORSELESS AGE:

In THE HORSELESS AGE of July 9 I read C. C. Bramwell's article on the motor bicycle endurance contest; also in July 16 Harold H. Brown's reply to same, and in July 30 Mr. Culver's article. I did not reply to Mr. Bramwell's article before because I was not a participant in that contest and was waiting for some of the riders in that event to defend themselves; but as they are not forthcoming fast enough I will have my say.

He states that the machines in the contest had jump spark ignition only. I sincerely hope he did not expect to find any hot tubes or hammer break methods of ignition in 1902. He further states that the electrical devices were too small and too delicate to withstand the strain, and that the spark plug was too small.

Now, the electrical devices on a motor bicycle are none too small nor delicate to remove and apply to a 7 or 8 horse power automobile single cylinder motor. The terminals of the spark plug in the largest automobile engines are set anywhere from 1-20 to 1-16 inch, and that spark will fire any good gasoline mixture and keep it up under the compression. A three terminal spark coil, such as used on most forms of motor bicycles, will, with three ordinary dry cells of battery, furnish such a spark for at least 500 miles and many times for over 1,000 miles, and the vibrator spring used on motor bicycles, being small and thin, will withstand more strain than if large and cumbersome. Even if it was more delicate I do not anticipate that any more trouble would be experienced. I have never experienced any such trouble as breakage of these parts (except porcelains) in any of the six motor bicycles I have owned, and I think that is the experience of other motormen.

He says that the mufflers were inadequate in all cases. Perhaps in that endurance run they were all vented to a greater or less degree to render the back pressure less, but I have seen many motor bicycles from which the exhaust could not be heard

in the still of night, and in my motor bicycle it cannot be heard o feet away, and there is no per- back pressure, the popping of the valve being easily detected while at any speed. He further says: of the machines exhibited any strik- as in designing a motor bicycle," t all the motors were more or less attached to the frame. I wonder served any motors entered in that ice race that were brazed to the nd that the frame constituted a part motor itself. They were there, two , and one finished first. That motor etty cleverly attached, wasn't it? I ith Mr. Bramwell when he says that jority of motor bicycles present an which way appearance in the ar- ent of accessories on the frame, but of them.

nentions the idler and that it will be dispensed with sooner or later. l no doubt be somewhat later. ther claims that the belt will have to l the chain be substituted therefor. ain has had its day; all the experi- motor bicycles had chain drive and ave adopted the belt, which is much atisfactory, as the wear and tear on otor is extreme in chain driven ma- , as well as the wear on the tires, the ness in starting resulting in the rear slipping or the chain breaking, while lt will slip a trifle and allow the mo- gain speed. If a chain were used it stop the motor at just the moment er explosion would carry you over ow of the hill. Many times I have belt break and hit me in the back hanked God it was not a 5-16 inch I am inclined to believe that the r rope drive has come to stay.

Bramwell says: "Let us suppose that erage motor cycle will start satisfac- in 600 feet, and that the motor pulley to the rear pulley a ratio of 7 to 1; at 600 feet the motor has 299 + es to get an explosion or explosions, get under way." He immediately es for all this 600 feet of pedaling ut the motor starting to too delicate If this theory could be accepted for gle moment by any motor cyclist how l he explain it if the motor started at d of the 600 feet and went for 50 miles ut a skip. Sometimes a motor does readily start on account of a sticky e valve that will clean itself after a gasoline vapor has been sucked in by and oftentimes a trifle of oil on the tor contact points will cause trouble st, but a few sparks will clean that, everything be O. K. I never had to l a motor cycle 600 feet to make it . Generally a couple of revolutions start my motor, and I can start any time going 50 feet if there is any gas- in my tank.

regard to Mr. Bramwell's statement the ordinary motor bicycle looks as he motor and accessories had been thrown at it and connected up as they fell, some of the motor cycles do look that way, but not those in which the motor is built integral with the frame. I trust that Mr. Bramwell will devise and construct a motor bike that will have all the good qualities that he claims the present ones have not, and if he does and is ever stopping over night in some small hamlet where kerosene only is used for light, I hope he will move his machine to some central location and give the "Rubes" the treat of an electric illumination. For no doubt he will have electric energy enough and to spare in his ponderous electric ignition outfit.

Mr. Bramwell's article was written to give others a chance to contradict him, so I trust he will be accommodated. Experience is the best teacher, and nobody is too old to learn.

EDWARD P. CLARK, M. D.

Progress of E. B. Martin's Chicago-New York Trip.

The Martin family, of Chicago, who left there in a Packard automobile which they called the "Flying Dutchman" on Saturday, August 9, for a trip to New York, reached Cleveland, Ohio, Tuesday night, and departed eastward the next morning. Thus far Mr. Martin has been delayed but one day on the road through breakage of his machine.

They arrived at Erie, Pa., on August 14, at 1:30 p. m. "The trip so far," S. K. Martin said, "has been uneventful. We have had fair roads and have struck some bad sandy places. On account of breaking the springs we were delayed eleven hours." The party left in the afternoon for Buffalo.

The party arrived in Buffalo on August 15, in the afternoon. There Mr. Martin said that after arriving his machine would be the third to make the run between New York and Chicago, the record for that distance being now held by E. B. Shaw, of Chicago, who made it in eighty running hours, but as the actual time spent on the road was ten days, Martin's machine bids fair to do better.

Trade Literature Received.

[We are sometimes asked to state that catalogues will be sent upon request. It is understood, we think, that any catalogue received at this office and mentioned under this heading will be sent upon request to any of our readers.]

"A Few Opinions." (Testimonials on the Veeder Odometers).—The Veeder Manufacturing Company, of Hartford, Conn.

Duryea Gasoline Carriages.—Duryea Power Company, of Reading, Pa.

The Spit Fire Plug.—Arthur R. Mosler, 309 Broadway, New York.

The Scott Hydrocarbon Motors.—J. A. Scott Motor Works, of St. Louis, Mo.

The Reflex Water Gauge—The Locke Regulator Company, of Salem, Mass.

...OUR... FOREIGN EXCHANGES

The Circuit des Ardennes.

As already briefly noted in our last issue the race referred to as above was run on July 31 and resulted in the victory of Charles Jarrott, an Englishman, in a 70 horse power Panhard Levassor machine. Following are some further details of this event:

The course of over 50 miles, which had to be circled six times, lay in the heart of a wild and desolate region of the Ardennes. It was a severe test of endurance for automobiles, tires and drivers. There were no halts allowed for refreshment for man or motor, no slowing down for passage through the towns. Luckily the little villages, Longlier, Habay and Bastogne, are sparsely populated, and the traffic is small.

The slate and granite roads were excellent, and owing to the recent rain there was little dust. The dust had been greatly feared, for with so many machines it would have converted the course into a blinding triangle, productive of even more accidents.

Baron de Crawhez was the first away, amid loud cheers, and then five other automobiles followed with two minutes' interval between each. After the first round of 50 miles was completed there was a strange scene in Bastogne, the automobiles, one after the other, descending the hill and rushing over the cobbles in the narrow streets with a terrific roar, covered with dust and mud and the drivers peering over their wind sheets, that made the automobiles look like runaway torpedoes. The soldiers kept back the crowd.

After the fifth round was completed there was great excitement. The automobiles were constantly rushing past, and at last that of Mr. Jarrott, which appears a dot on the white road, grows swiftly into a Panhard automobile, which flies shrieking by. It soon appears that it was an English win on a French machine, but very popular.

His time was 5 hours 53 minutes, or 57 miles an hour for the 318 miles. M. Gabriel, on a Mors, was nine minutes behind Mr. Jarrott. Mr. W. K. Vanderbilt, Jr., was third, on a Mors, which M. Fournier should have driven. M. Rigolly, on a Gobron-Brillié, was fourth among the heavy automobiles, but he also came in first among the light automobiles. Comte Zborowski, on a Mercedes, was fifth and Mr. Heath sixth.

There were many accidents. That no deaths occurred is an absolute miracle. Baron de Crawhez, who was running splendidly, tried to pass M. Coppée. He touched his wheel and was himself hurled into the ditch. There was a vast cloud of dust and it was curious to hear the sudden stop of the machinery. The accident to Baron de Crawhez was unfortunate, as he had won

the prize offered by Count Raczynski for the first automobile over the first 60 miles of the race.

M. Jenatzy's accident was more serious. His tire burst and the automobile overturned with his man under it. He was thrown clear, but his face was badly cut, while his man was bruised internally. M. Jenatzy is out again with his head bound up.

M. Charron, on a new automobile, collided with another and tried to stop. Baron J. de Crawhez tried to turn the corner too fast and ran into a wall, flattening his automobile. He, by a miracle, was only badly shaken.

A Decauville ran into a cow which had strayed onto the road in defiance of the bourgmestre's proclamation. A vehicle in front had steered clear, but the driver of the Decauville could not see the animal for the dust, and the result was equally as bad for the car as for the cow.

Another narrow escape was that of Baron de Caters, who, in trying to pass a vehicle ahead of him, went too far to one side of the road. The outside wheels went over the precipitous edge of the road, but the vehicle itself fortunately remained on the edge. Altogether this race seems to have been the most disastrous to the vehicles of any yet held. The following table gives the results of the race:

HEAVY RACERS.

	H.	M.	S.
C. Jarrott (Panhard et Levassor)	5	53	39 3/5
Gabriel (Mors)	6	2	45 1/5
Vanderbilt (Mors)	6	22	0 3/5
Count Zborowski (Mercedes)	6	46	40 3/5
Girardot (C. G. V.)	6	55	55 2/5
Heath (Panhard et Levassor)	6	57	3 3/5
Augières (Mors)	7	43	50
Stead (De Dietrich)	8	0	0
Loraine-Barrow (De Dietrich)	8	9	3
F. Coppée (Germain)	8	32	35
Hautvast (Piper)	9	11	29
Wattecamps (Germain)	9	15	24

LIGHT CARRIAGES.

	H.	M.	S.
Rigolly (Gobron-Brillié), alcohol	6	42	16 4/5
Guders (Panhard et Levassor)	7	1	46 4/5
Edmond (Darracq)	7	4	30 3/5
Berteaux (Panhard et Levassor)	7	26	47
De la Touloubre (Decauville)	7	36	38
Uhlmann (Decauville)	7	37	53
Collin (Darracq)	7	44	20
Durand (Mors)	7	48	53
Tart (Clément)	7	50	15
Barbaroux (Clément)	7	59	6
Perrin (Delahaye)	8	0	14
De Laugick (Delahaye)	8	3	37
Dernier (Gobron-Nagant)	8	58	2
Page (Decauville)	9	26	29
Conrad (Gobron-Nagant)	10	32	15

VOITURETTES.

	H.	M.	S.
Corre (Corre)	9	34	39
Luza (Prunel)	12	12	37
Kuhling (Vivinus)	12	21	14
Thellier (Passy)	12	25	26

At 3 o'clock the crowd gathered for the motor cycle and motor tricycle races. The competitors started three at a time, the machines leaping dangerously over the cobbles of the village. About twenty competed. Between each three there was a two minutes' interval, as in the automobile competition, but the distance was less. only twice round the course.

By this time all the countryside had gathered at Bastogne—peasants, priests and woodcutters. Above the village the road descends in long curves, and on it all eyes were fixed. At last the first machine appeared—a black pin point on the white surface, growing with extraordinary rapidity. It was Osmond, who did so well in the Paris-Vienna race. His time for the 104 miles was 2 hours 5 minutes. Others followed close, streaming away over the course for a second turn.

Jarrott said that the roads were splendid. He could have made faster time, but could not pass the cars ahead. He thought that the new style of race would supplant the old fashioned international competition with frequent stops. Three hundred miles straight away was a great strain on car and driver, but he was quite fit.

The Third German Automobile Congress.

The third German automobile congress was held at Eisenach July 25 to 28. The congress was organized by the Mitteldeutsche Automobile Club, and the delegates to the congress, which represented every automobile club in Germany, were welcomed by short addresses by Herr Ehrhardt, president of the organizing club, and by Herr von Fewson, mayor of Eisenach. The latter laid stress upon the national character of the congress, as compared with the international scope of the Paris-Berlin race, which was the most important event in the automobile world of Germany last year. The reception of the delegates took place at the Kurhotel Fuerstenhof, and the program for the first evening included, besides the address of welcome, a concert by the hotel orchestra.

The forenoon meeting on the 26th was well attended. General Becker introduced the new secretary of the association, Herr von Rabenau, and then formally opened the session. The report for the last business year was read, from which it is gathered that during that period five new clubs have become members of the association, which now comprises sixteen clubs, with 850 members. The Mid-European Motor Wagon Association has not yet joined this association, but negotiations are in progress. It developed later that the reasons why the Mid-European Association had not yet joined are of a financial nature.

The speaker then dwelt for some time on the subject of ordinances for the regulation of automobile traffic. Originally these regulations were promulgated by the Government, which proceeded in a very liberal manner. Thus, for instance, the police authorities of Berlin invited the cooperation of the Deutscher Automobile Club. If once a considerable territory had definite automobile regulations, other communities would follow suit and adopt these regulations. Much trouble is now experienced from the fact that subordinate police officials are unable to comprehend the regulations. That will all be changed in the future; general regulations for the whole empire are now under consideration, and the German Automobile Association is to be consulted respecting details of these regulations.

On the other hand, the automobilists themselves must always respect the just requirements of the regulations. They have no right to consider the road as existing solely for their use. Here it is the duty of the clubs to exert an educational influence on those members who are inclined to disregard the regulations.

In regard to the establishment of gasoline supply stations, one of the chief objects of the association, the speaker remarked that the association had begun to compile a list of gasoline depots, but unfortunately it was very incomplete. It was therefore suggested to intrust the completion of this work to private enterprise, and the publisher of *Das Fahrzeug* had offered to undertake the work. "The Automobile Tourist's Guide Through Germany" was published by him last spring, and is, according to the speaker, a very practical work. He had occasion to appreciate its value during a trip he made this summer, which occupied several weeks.

The association has made arrangements with two insurance companies with regard to insurance against damage suits. However, the individual clubs are not under any obligations and it remains a matter to be decided by each club or member whether he wants to insure or not.

The association also supplies signs for gasoline stations.

The financial condition of the association, the speaker said, must be considered favorable. The treasury surplus at present amounts to about $1,000. There was no reason, he said, to accumulate a large capital without making corresponding efforts in behalf of the movement. It would be advisable, however, to conduct the affairs of the association on an economical basis.

The financial report was then read by Herr Lewin and this concluded the first part of the day's program.

The second part of the program related to changes in the constitution of the association and after the revised constitution had been adopted Herr R. Zechlin read a report on the goods vehicle competition between Leipsic and Eisenach, which he considered an excellent success in view of the unfavorable weather. The roads were in an unusually bad condition, grades of 8 to 10 per cent were encountered and in spite of these various obstacles every competing vehicle arrived at

the finish. Students of the technical high school acted as official observers.

Frankfort on the Main and Munich were suggested as places to hold the next annual automobile congress and Munich was finally decided upon after it was urged in its favor that the Bavarian Automobile Club, which is located there, purposes to organize next year about this time an endurance contest through the whole of Germany. The meeting then adjourned.

In the afternoon the delegates to the congress made a trip to the historical Wartburg, mostly in automobiles, and in the evening a banquet was spread at the Hotel Fuerstenhof, at which there were about 100 guests.

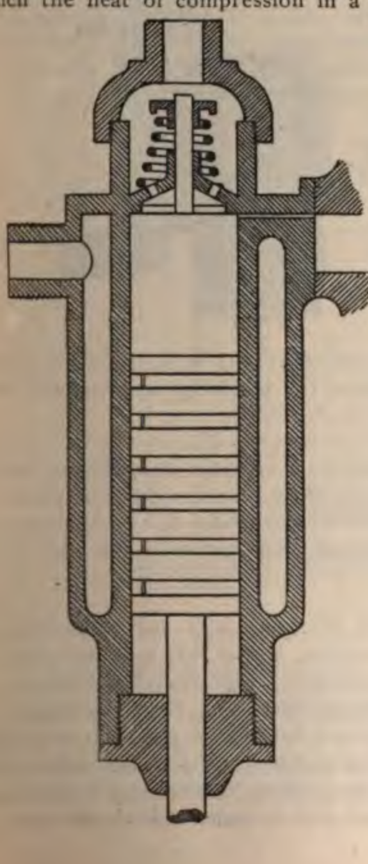
On Sunday, July 27, an automobile excursion was made into the surrounding country and in the afternoon there was an automobile flower carnival in which between forty and fifty vehicles participated. This event was of great interest to the general public and large crowds viewed the procession of the decorated autos.

On Monday morning sixteen automobiles with about fifty occupants started on a trip through the Thuringian forest. The trip ended at Rudolstadt and from there the different vehicles went in different directions.

The weather was exceptionally favorable during the entire time of the congress.

De Dion Self Igniter.

De Dion & Bouton have taken out a patent in France for a device intended to be used for explosive engine ignition in which the heat of compression in a special small cylinder is caused to produce a flame. The small cylinder is fastened to the side of the main cylinder and is in communication with the compression space of the latter by a small passage. In the small cylinder works a tight fitting piston which is forced upward in it, once for every two revolutions of the engine crank shaft. An explosive mixture is admitted to the cylinder at the upper end thereof through an automatic suction valve. When the piston in the small cylinder is forced upward the gaseous charge therein is compressed to the point of self ignition and the flame travels through the small passage to the compression chamber in the main cylinder and explodes the charge therein. In order to vary the time of ignition the mechanism by which the piston in the small cylinder is operated must be arranged to effect this operation at a variable period. The cylinder is preferably water jacketed, as shown.



The list of entries for the British 650 miles reliability trial, to be held in September, has already reached eighty.

M. Darracq, of Paris, has been elected a member of the honorary committee of the Leipsic automobile exhibition.

A second automobile club is being organized at Lyons, France, composed chiefly of members of the trade.

René de Knyff, the automobile racer and director of the Panhard & Levassor Company, has been elected to the Legion of Honor.

A tour in automobiles around the country was recently undertaken by a number of automobilists of Buenos Ayres, Argentine Republic.

The chief of the fire department of Hanover, Germany, has designed an alcohol, self propelled fire engine, which is in use in that city.

One hundred and twenty-seven new members were added to the lists of the General Automobile Association, Paris, at the committee meeting held July 25.

Consul General Wither, of Ecuador, stationed at New York, has obtained a concession to operate an automobile mail delivery between Quito and Guayaquil, Ecuador.

The best qualities of vulcanite show on fracture a lustre something of the nature of jet, and the poorer qualities show a corresponding dullness. Although easy to machine, it is hard on tools, and in sawing, turning, planing or milling the best speed is that at which brass is machined, and milling should always be accompanied by a free use of soap and water. In turning or sawing lubricants should be avoided.—*English Mechanic.*

The Department Society for the Advancement of Agriculture, of Herault, France, will hold an alcohol exhibition and alcohol automobile contest at Montpelier in October next.

Dr. Sheppard, of Liverpool, has ridden over 1,800 miles on a Singer motor bicycle, and now uses only one horse where two were formerly necessary.

The Chambre Syndicale de l'Automobile, the French organization corresponding to our N. A. A. M., at a recent meeting passed resolutions advising its members not to participate in the proposed Paris-Bordeaux race, which has been held annually thus far.

It was rumored in Paris that the Mors vehicles were prevented from making a good showing in the Paris-Vienna race by fraudulent tricks on the part of certain unscrupulous mecaniciens, of which several have already been apprehended and delivered up to the courts.

The A. C. G. B. and I. will hold a motor cycle race on the Crystal Palace track on Friday, August 29. The events are: (1) Hour scratch race for motor cycles (limited to twelve starters); (2) 5 mile motor cycle handicap for a challenge cup; and (3) a 10 mile motor cycle handicap.

The automobile excursion, Berlin-Hamburg and return, organized by the Mid-European Motor Wagon Association, was officially abandoned, owing to bad weather. Seven of those who had entered ran over the route, however, and completed the trip in good shape. The excursion will take place next month.

During the first six months of 1902 there were imported into Belgium eighty-two automobiles, valued at $55,415, compared to forty vehicles, valued at $34,678, during the same period last year. The exports during the same period consisted of 113 autos, valued at $119,740, compared to seventy-nine vehicles, valued at $66,929, during the same period last year.

A German contemporary describes a new galvanic cell which "inhales" the oxygen of the air. The cell contains in a saturated ammonium chloride solution a zinc rod and a porous pot provided with a semi-porous membrane. Within the porous vessel is placed a retort carbon, and the vessel contains a special depolarizing liquid. This depolarizing liquid constitutes a sort of a chemical sponge, which when in the air absorbs the oxygen thereof and gives it off again in the process of depolarization. The depolarizer consists of ammonium cuprate.

NEW VEHICLES AND PARTS.

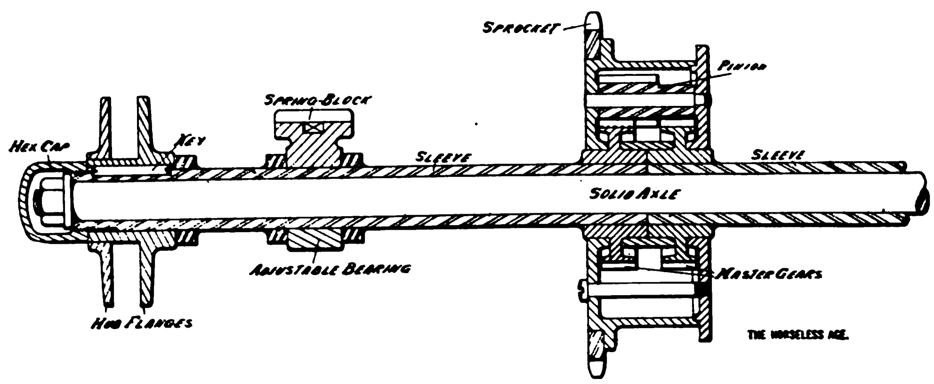
The Law Gasoline Vehicle.

According to the Hartford *Courant* the Electric Vehicle Company is soon to bring out a new gasoline carriage, the design of Fred. A. Law.

The Law vehicle follows the general outward lines adopted by most foreign manufacturers. It is equipped with a double cylinder motor. Four speeds ahead and one reverse are controlled by a single lever with safety locks preventing any possibility of improper gear shifting. The clutch system is of new design, and every detail of the driving mechanism is said to be so arranged that binding of the parts is impossible. The engine is mounted in a forward hinged bonnet. The shaft drives directly to a countershaft connecting by chains with individually propelled driving wheels. A new form of wheel steering is employed. The body, of the tonneau type, is entirely independent of the chassis and consists of three parts. In place of the tonneau part may be substituted a straight back, a surrey back or what is known as the fish cart back. The body is supported above the axle by two full elliptical springs at the rear and two half elliptical springs in front, these being so arranged that all driving strains are taken directly and in the plane of the wheel centres. There are two brakes, one for regular use and one emergency brake. The engine is water cooled, forced circulation being employed. The cooling coil is carried forward of the bonnet and is said to have sufficient radiating surface to maintain a constant low temperature in the water around the cylinders.

Auto Supply Company's "Through" Live Rear Axle.

The Auto Supply Company, 310 Mott avenue, New York, are manufacturing compensating gears and axles of the type we illustrate herewith, in addition to their well known line of equipments. In the dominating form of live rear axle the tubing does not revolve and the master gears of the differential are secured to solid shafts which extend into the hubs of the driving road wheels. The latter are keyed to these shafts and revolve with them. The bearings of the shafts are located at the ends of the tubes which, with the yoke that embraces the equalizing gear drum, constitute the axle proper.



AUTO-SUPPLY COMPANY'S REAR AXLE.

Mr. Lurie, the engineer of the above named company, has adopted other principles of construction. In his design the master gears in the drum are brazed to their respective tubes, which latter extend into the wheel hubs that are keyed to them. In the cut only a little over half of the complete axle is shown, the other part being identical in design. A heavy bar of steel is placed inside the tubes and fits them snugly, making a running fit. At both ends there are nuts which hold the rod in place. When the vehicle is running straight ahead this rod revolves with the tubular shafts. Whenever the machine turns a corner the differential acts, the inner road wheel makes less turns in a given time than the outer one does, and the solid rod revolves at a rate approximating the mean of the speeds of the tubes. In other words, only when the equalizing gear is obliged to act is there relative motion between the tubes and between them and the axle proper (the bar). It is obvious that the latter is employed to brace the tubes and relieve them of bending strains.

The hubs are of the artillery pattern and are fitted with hexagon caps. The flanges are designed for wood wheels. In the illustration three collars are shown. One of them prevents the wheel from leaving its place and the other two keep the axle in proper relation to the spring blocks. In all there are six collars, which are brazed to the tubes.

The differential is of the spur gear type and consists of a drum, to which the sprocket is bolted, master gears and pinions; also a circular plate that has a male joint fitting into the female joint of the drum, and is secured to it by screws, one of which is shown. A sleeve embraces the hubs of the master gears to insure their proper alignment. The pinions are turned up out of solid steel and the large gears are turned up out of drop forgings. All of them are case hardened. The sprocket is made out of wrought steel instead of being a casting. The holes for the pinion shafts are drilled in a jig and provide for heavier pins than are usually employed. Brake bands may be applied to the finished periphery of the drum.

"Standard" Concord and Artillery Wheels.

The Concord wheels manufactured for automobiles by the Standard Wheel Company, of Terre Haute, Ind., although in appearance they are quite similar to the well known artillery hub in principle they are quite different, inasmuch as the ordinary "wood hub" spokes are driven into a wooden hub centre after the latter is securely compressed and bolted between iron flanges which complete the hub and also form the box for the axle, the wooden centre being also banded on either end, making, it is claimed, the strongest hub possible to make, and at the same time giving it greater elasticity.

The same company also manufacture artillery wheels, using the most approved methods of compression during construction. They report having made arrangements with a number of manufacturers of artillery hubs to fill the hubs for them.

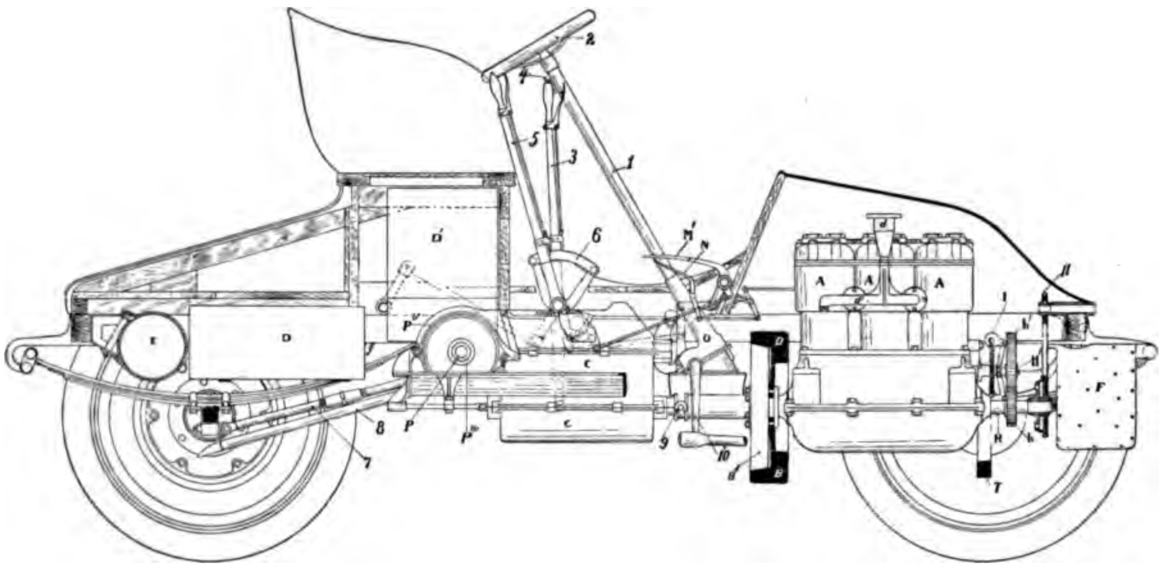
Dyke's Bike-Motor Vaporizer.

The cut below illustrates a small vaporizer suitable for bicycle motors, which has recently been placed upon the market by A. L. Dyke, of St. Louis. In carbureting devices of this size it is usual to dispense

with the float feed attachment to secure lightness and simplicity, and that has been done in this design.

During the recent meeting of the British Institution of Mechanical Engineers at Newcastle they paid a visit to Stephenson's cottage at Killingworth in automobiles.

The Motorfahrzeug und Motorenfabrik Marienfelde, Berlin, has been absorbed by the Daimler Motoren Gesellschaft, of Cannstadt, Germany. The Daimler Company have decided to carry on a large part of their business at the Marienfelde works. The Marienfelde Companw was originally formed with a capital of $1,250,000.



ELEVATION OF TOLEDO GASOLINE TOURING CAR.

1, Steering post; 2, steering wheel; 3, change speed lever (three forward and reverse); 4, reverse control button; 5, brake lever operating on large hub brake drums (this lever also releases clutch); 6, locking sector; 7, adjustable distance rod (one on each side); 8, sprag; 9, clutch drawing fork; 10 10, steering connecting levers; 11, starting sprocket.

The Sixteen Horse Power Toledo Gasoline Touring Car.

A half tone cut of the new touring car of the International Motorcar Company appeared in our issue of July 23, and we publish herewith two drawings of the mechanical arrangements of this car, one representing a plan and the other a sectional elevation.

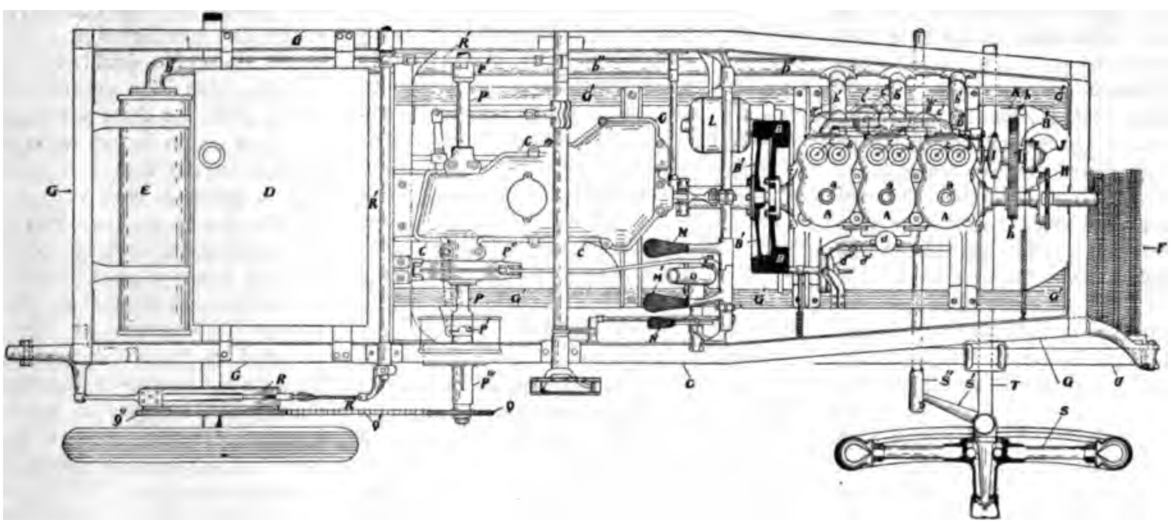
The 16 horse power motor is of the three cylinder vertical type, 4¼x5¼ inches. The cranks are set at 120 degrees. The power is conveyed through a flywheel clutch of 16½ inches diameter to the primary shaft of the transmission gear, which is equipped with the necessary sliding gears to permit three forward speeds. The reverse is effected through an intermediate pinion interposed at will between the first speed gears, thus reversing the direction of rotation of the secondary shaft. This shaft transmits the power by bevel gearing to the spur differential carried on the cross countershaft.

The countershaft is provided with two long bronze bearings attached to the frame of the vehicle, and a sixteen toothed sprocket is carried at each of its extremes. The countershaft is provided with universal joints to compensate for any alteration of alignment due to road stress, etc. Five-eighth inch roller driving chains of 1¼ inch pitch carry the power to two 16½ inch, forty toothed sprockets bolted to the spokes of the driving wheels. The driving sprockets are also provided with 1¾ inch brake drums, the band brakes being actuated by the outside hand lever.

The speed of the motor is controlled by a throttle governor attached to the inside face of the cam shaft gear. A hand lever controlling the spark lead is also provided and conveniently located above the steering wheel. A large float feed carburetor supplies the cylinders through a threeway induction pipe. A branched exhaust pipe conveys the exhaust gases to a cylindrical muffler placed at the rear of the car.

The main vehicle frame is of ash interlined with steel flitch plates reinforced at the corners by forged angle pieces elongated to form spring carrying horns.

Reverting to the governed throttle, when advancing the spark to increase the speed above that permitted by the governor the action of the latter mechanism is suppressed by means of a small foot pedal. Thus, if pressure on the pedal is maintained, the speed of the motor is entirely at the command of the operator through the medium of the hand operated spark lever. When driving through traffic the speed of the car may be reduced from the maximum to well under 10 miles an hour without shifting the gears.



PLAN OF TOLEDO GASOLINE TOURING CAR.

A A A, engine; B, flywheel forming clutch member; B′, movable clutch member; C, transmission gear case; D, water tank; E, muffler; F, radiator in part; G G G G G G G, ash frame interlined and reinforced with steel; G′ G′ G′ G′ G′, steel sub frame carrying engine and transmission; a a a, ignition plugs; b b b, exhaust valves; b′ b′ b′, exhaust tubes; b″, exhaust pipe to muffler; c c c, inlet valves; c′ c′ c′, inlet tubes; c″, vaporizer; d, water funnel; d′, water pump connections; d″, water pump; d‴, cylinder head water connecting tube; H, engine shaft; H′, engine cam shaft; h, pinion meshing with cam shaft gear; h′, cam shaft gear; I, governor throttling vaporizer; J, contact breaker and case; K, wire to hand lever for altering lead of spark; L, dynamo; M, clutch pedal; M′, clutch and countershaft brake pedal; N, throttle lever; O, steering post bushing and bracket; P, countershaft; P′ P′, countershaft universal joints; P″, countershaft band brake; P‴, countershaft exterior bearing; Q, countershaft sprocket; Q′, right hand driving chain; Q″, right driving wheel sprocket attached to spokes of wheel; R, driving wheel band brake operated by hand lever; R′, brake connections to hand operating lever 5; S, right hand front wheel; S′, steering knuckle; S″, steering link; T, front axle; U, right hand front spring.

Automobile Tires.

[From *The Engineer*, London.]

With the increased interest in motoring, to use an accepted colloquialism, it is only natural that a corresponding amount of attention should be attracted to the rubber tire, which forms so important an accessory to the mechanism. Despite the strenuous efforts which have been made to find some substitute for rubber in the manufacture of motor tires, really no success at all has been attained, nor does there seem the slightest chance of the problem being solved. Of course, in matters where chemical knowledge comes into play, he would be a bold man who ventured to speak in confident terms of the future and its possibilities. In saying this we must, of course, be understood as referring only to motors where speed and comfort are matters of prime consideration; the case of lumbering vehicles for goods traffic comes under quite a different set of considerations, whose trend does not come within our purview today. With regard to the relative advantages of pneumatic and solid tires for passenger motors, we are inclined to be chary of expressing any definite opinion, especially as it is somewhat outside the limits which we have set ourselves. To say just one word, however, on both sides, it is generally acknowledged that while the pneumatic bears off the palm for comfort and speed, yet the solid has the advantage of giving its owner an immunity from puncture vexations. These considerations will doubtless continue to weigh in the future as in the past with varying force, according to the idiosyncrasies of the automobilists, and their elimination as factors in the choice of a tire is seemingly dependent either upon the discovery of a non-puncturable rubber or in the perfection of the semi-pneumatic tires, types of which are on the market already having their potentialities put to trial. This brief reference to the subject embodies points on which all are agreed. Into other points of a controversial nature we do not propose to enter, although we in no wise wish to minimize their importance, or to give the impression that there is nothing new to be said regarding them. In the majority of cases, no doubt, those who hold decided opinions as to the merits of this or that tire are speaking at first hand from the fruits of practical experience, considerable sums having been spent by many in the trial of new tires, whose appearance on the market has been heralded with the customary trumpeting of the advertisement column.

It is only in the nature of things that disappointments have in this way been met with, and this not so much by the false nature of the glowing advertisement, but rather from the fact of the goods being marketed before their capabilities had been thoroughly tested by what is really the only test of value in the case of rubber goods—that of time. What we mean to draw special attention to in saying this is that the manufacturers of new tires cannot complain that motorists have ignored them. So far from inattention having been displayed, the British motorist has been ready enough to give a trial to new tires of home production. It has always been much of a mystery to Englishmen why our rubber manufacturers, who can beat their continental competitors in so many other classes of rubber goods, have shown up so badly in the motor tire business, and have allowed French and German names to become synonymous with merit. What motorist has not learned to couple the name of Michelin with perfection, as far as this can be attained, and how many growls of dissatisfaction has not one heard with regard to the product of home industry. We cannot stop here to enlarge upon the various circumstances attending the growth of the motor tire industry; such a topic would require an article to itself, but in extenuation of the British rubber manufacturer it may be said that motoring developed much more quickly in France than it did in this country, and that the French manufacturer saw his way to making large profits much more clearly than did his British confrère. The manufacture, it must be noted, is not at all a simple one, nor can it be carried on with a small capital. In the case of molded tires, the provision of metal vulcanizing molds is a somewhat serious item in the work, and it is hardly surprising that our manufacturers were not in a hurry to sink capital until the prospect of doing regular and remunerative business was assured. It would be incorrect to suppose that the large profits realized by Michelin et Cie. have been obtained without a considerable outlay in experimental work; indeed, quite the reverse is the case, as would be clearly shown if the Clermont-Ferrand firm were inclined to give the world the story of the trials and disappointments that preceded success. It may be asked, where does the difficulty of manufacture come in and what is there to prevent the British manufacturer from turning out tomorrow as satisfactory an article as any which comes from France, and, we may add, from Germany and America? To answer this query completely would necessitate plunging into a depth of technicalities which the general reader could hardly be expected to fathom. However, a few words on the subject will not be out of place, and they may serve as a groundwork for those desirous of prosecuting their studies to a fuller extent.

Looking at the manufacture generally, there are three main heads, all necessitating the exercise of great care, as any failure in one or other of them would go a long way to destroy what makes for perfection in other respects. These heads are: employment of the best quality of rubber, the correct degree of vulcanization of this rubber, and judicious selection of the canvas. This last point is one that has had special attention paid to it on the Continent—much more so, indeed, than has been the case in Great Britain, and we feel confident of our ground in averring that this is the chief rock on which our home manufacturers have struck in their bid for the motorists' favor. The pressure which the textile has to stand during the course of a long run, to say nothing of the heat which is engendered, necessitates the use of the strongest possible material; and further than its intrinsic strength, there is is a great deal in the method of weaving. As we have said, it is close attention to the question of the canvas that has contributed so largely to the success that has been achieved by such tires as those of Michelin and the Continental Rubber Company, of Hanover, and it is, we are convinced, due to defects in the same direction that failure has dogged the footsteps of some of our own manufacturers, whose work in other respects, as regards the choice and vulcanization of the rubber, really left nothing to be desired. It is desirable that our manufacturers should be under no illusion as to the particular points where they have gone wrong in the past. With regard to the rubber, there can be no two opinions; this should be the best Para; any admixture of inferior brands or of old rubber, which is so often put in second grade cycle tires for motives of economy, being quite inadmissible. It is somewhat unfortunate that it is so difficult to prove the presence of inferior rubber when admixed with Para. If this difficulty did not exist, there would be much less scope for what we must perforce call doubtful dealing. In saying this we do not wish to insinuate that good value is not, as a rule, given for the money, but in so many branches of the rubber manufacture advantage has been taken of the ease with which the best rubber can be sophisticated, that it is difficult to imagine that motor tires will altogether escape the contagion. Of course, where a tire is sold openly as second grade the purchaser needs no commiseration if it fails to give satisfaction. No doubt, in the cycle trade the provision of a second grade tire has met a want, for there are many occasional riders to whom money is an object. With respect to the motor tire, however, the case is different, both as regards the work the tire has to perform and the means of the purchasers, and we do not see any field for a second class article. The use of commoner material than the best Para rubber is, however, we fear, sure to be resorted to when competition becomes keen, and it behooves purchasers to be on their guard and not to assume that they have necessarily made a bargain when they buy a tire at a lower figure than is charged elsewhere. The matter, however, is not at all a simple one on which to arrive at a correct conclusion, as the rubber in this case is not sold by weight. It may easily happen that, owing to a tire being of a light build, it may be made of the most expensive rubber, and yet cost less than another one made of inferior mate-

rial. In any comparison of prices it is important duly to note this point, otherwise an injustice may unwittingly be done. To mention further points on which the customer may be misled would take up undue space, and, all things considered, if any sort of unfair dealing is intended, it will always be a difficult matter for the purchaser with his limited knowledge to protect himself fully. Reliance on the honesty of a firm of repute is really the only course open, and such confidence will very rarely be found misplaced. Of course, the best firms are liable through carelessness or incapacity on the part of workmen to make mistakes, but such firms rarely refuse to render amends to the purchaser for loss sustained where any error in manufacture is brought home to them. Probably in their minds there is always existent a feeling that they may be imposed upon by the unscrupulous who have been culpably careless in their treatment of the tires. It is unfortunate that any real cause for this feeling should exist, because, of course, it renders genuine claims liable to be regarded with the eye of suspicion.

Owing presumably to the absence of competition, it has not become the custom in this country, as in France, to give a guarantee of so many months with motor tires, though with respect to cycle tires it is now the general rule to give a twelve months' guarantee.

To turn again to some practical points, although we have said decidedly that the best Para rubber should be used, yet this must not be taken as a statement that the tire is best made of pure rubber throughout. It is now recognized that a tire containing a certain proportion of zinc oxide —a mineral largely used in the rubber manufacture—is better suited to resist puncture and abrasion than is one of pure rubber throughout. Moreover, it is less liable to the defect known as sun cracking—a defect, however, which we think is more apparent than real, and which has had rather more noise made about it than was warranted. Various processes, it may be added, are now in operation to prevent or reduce this action of the solar rays, and from the progress which has undoubtedly been made it is likely to occur much more rarely in the future than in the past. As we have said, we are not dipping into the minutiæ of manufacture; but as the term vulcanization is so often cropping up in connection with tires, it seems desirable to say a word or two by way of elucidation. Briefly speaking, the rubber is submitted to the process of vulcanization in order to destroy its tendency to be affected by heat or cold, and also to increase its elasticity. This effect may be produced by more than one way; but as far as rubber tires are concerned, sulphur and heat in conjunction are the invariable agents. The sulphur is intimately incorporated with the rubber by means of revolving steel rollers, the ensuing processes varying according to whether the tire is to be of the molded type or the hand made type. In the former case, the rubber having been calendered into sheets of the requisite thickness, is fastened by means of solution to the canvas base, and the tire having been made up, the whole is put into the mold, and submitted therein to the action of high pressure steam in a "vulcan" pan. In the case of the hand made tire, the strips of rubber are vulcanized as cut from the calendered sheet, being afterward "solutioned" on to the canvas either on the spot or possibly at the premises of some tire company for whom they have been made. There is something to be said for and against both these systems; but as the matter is contentious it hardly seems advisable to enlarge on it here. As has already been pointed out, the provision of large metallic molds is a matter of considerable capital outlay, and undoubtedly this fact has had a good deal to do with the adoption of the hand made process in some cases. There is just one other point that may be referred to, and this is that in the case of the hand made tire the canvas has not to be subjected to the vulcanizing heat, and this is an undoubted advantage.

Turning now to the question of repairs to damaged or old tires, it seems to be a moot point as to whether it is really worth while to pay for the doctoring, or whether it is not the best policy to discard altogether an inefficient tire in favor of a new one, however much the item of cost may come into consideration. Of course, complete and comparatively cheap repairs in the way of new treads are largely advertised, but the results do not, to judge by all accounts, show up at all satisfactorily in the case of motor tires, whatever is to be said with respect to cycle tires. The new tread may be either solutioned on, which is the most general method, or it may be vulcanized on. In the former case it is found more often than not that the attachment is not proof against road friction, and the intrusion of dirt frequently takes place, to the chagrin of the motorist. On the other hand, where the tread is vulcanized on it will be seen that the rest of the rubber has to undergo a double vulcanization, which is by no means conducive to its longevity. Of course, it may be argued that a mended tire is not intended or expected to rank with a new one, and that it would be unfair to credit it with equal lasting powers. Where this is put forward there is all the more reason for seriously considering whether the game of repairs is worth the candle, and whether the cost of new tires had not better be faced at once. In cases of this sort, no doubt, the experience of individuals will vary within wide limits, and while we feel sure that in what we say we shall carry many of our readers with us, we shall not be in the least surprised to find others in the opposite camp.

Kerosene Number, May 28, 10 cents.

MINOR MENTION

Hayes & Dunn are preparing to open a new storage and repair station on Fifty-eighth street, near Madison avenue, New York.

It is reported that the Wilmington Wheel Company, at Elsemere, Del., will soon begin the manufacture of automobiles.

It is stated that the New York City Street Cleaning Department will shortly experiment with a motor garbage collector.

An automobile parade including twenty vehicles was held at Asbury Park on August 12 in connection with the Sportsmen's Show.

The Kensington Automobile Company, Buffalo, has mortgaged its plant on Northumberland avenue to the German Bank for $25,000.

It is rumored in Springfield, Ohio, that a company with $500,000 will locate there to manufacture an automobile designed by C. W. Russell.

An automobile has been ordered to run between Cochise Station and Turquoise, Ariz., which will carry the mail, express and three passengers.

The Automobile Club of the Twenty-sixth Assembly District is the latest automobile organization in New York city. It is a Tammany organization.

The Massachusetts Automobile Club, it is said, will hold a race meet at Readville, Mass., on October 11, in connection with the New York-Boston endurance contest.

The Los Angeles Motor Cycle Club was organized August 1 with twenty-two charter members. Ralph Hamlin was elected president and Harvey Waterman secretary.

The Marble-Swift Automobile Company was incorporated in Phœnix, Ariz., on August 3, with $1,000,000 capital. The incorporaters are Harry G. Adams and George P. Swift.

F. H. McNeil, formerly with the Western Gas Engine Company, of Mishawaka, Ind., and J. H. Mears will start an automobile agency and repair station in Chicago under the firm name of Mears & McNeil.

The new automobile company recently incorporated at New Concord, Ohio, with H. L. Warner as manager, will put upon the market a gasoline vehicle which they call the "steel mobile." A new brick building is being erected.

The Phelps Motor Company have begun the manufacture of gasoline automobiles at Stoneham, Mass., and will have their salesrooms at the Boston Automobile Exchange, Massachusetts avenue, Boston. The vehicle is said to be of 10

horse power and to weigh 800 pounds. The factory of the company is located on Tidd and Pine streets and has 40,000 square feet of floor space.

Kenneth Skinner returned from a trip to Europe on August 9 on the American liner St. Paul.

T. A. Ells, of Vicksburg, Mich., has completed a gasoline carriage after designs of his own.

President Scarritt, of the A. A. A., has recently returned from an extended tour in his White steam carriage.

Mr. and Mrs. Elmer B. Martin, of Chicago, started on an automobile trip from that city to New York on August 9 in a Packard machine.

It is reported that the Racine Boat Manufacturing Company, Racine, Wis., will erect large buildings to be used in manufacturing automobiles.

A blaze in the station of the Mississippi Valley Automobile Company at St. Louis, on August 9, is said to have been caused by somebody accidentally stepping on a match lying on the floor.

The Ranier Company have opened an automobile storage station at Twenty-seventh street and Ninth avenue, New York city, and will also act as agents for the Vehicle Equipment Company.

The International A. & V. Tire Company announce that they are now installed in their new factory at Milltown, N. J., and have their solid and pneumatic tire departments in working order.

There will be a race between an automobile and a horse at the coming Elks' Fair at Lexington, Ky. The automobilist, Carl Fisher, is to drive 1 mile and the horse to make three-quarters of a mile. The stakes are $250 a side.

The Pabst Cycle Track Association was formed at Milwaukee, August 12, for the purpose of giving motor paced races during the balance of the season. Paul Thiesges is president, Orlando Weber secretary, and H. O. Messier manager.

The J. A. Scott Motor Works, St. Louis, have brought out a double opposite cylinder gasoline motor of 8 horse power and will soon have ready a four cylinder vertical motor of 16 horse power. They are also working on three special gasoline automobiles.

The New York Edison Company has placed an order for several electric automobiles, including four tonneaus and two surreys, for the use of the superintendents of the various illuminating and power companies in New York city and Brooklyn which are controlled by the Edison company.

The inventor of another first automobile has just been discovered. According to the Boston *Herald*, in 1804, M. Isaac de Rivaz, a Swiss engineer, first drove a cart by the aid of a motor, the force being gas. In 1813 the inventor made another cart 20 feet long. He loaded it with 1,400 pounds of stone and several persons, and successfully drove it down the principal street of his town. The French Government gave the inventor a patent, which document still exists.

The chief of the fire department of Syracuse, N. Y., has been provided with an automobile.

D. C. Baker, a pioneer automobilist of Columbus, Ohio, left on August 11 with a party of Cleveland people for an automobile trip from that city to New York city.

The American Railroad Company, of Porto Rico, in which De Ford & Co., of Boston, are said to be largely interested, is planning for an automobile service between Camery and Aquadilla.

Frederick M. Lande was elected secretary of the National Association of Automobile Manufacturers by the executive committee at their meeting on August 12 to succeed E. P. Wells.

The Otis Elevator Company have received an order from the General Electric Company for seven complete electric elevators, with Otis motors and controllers, for installation in the shops at Schenectady.

In a 5 mile automobile race recently held at Belleville, Ill., under the auspices of the Southern Illinois Automobile and Cycle Club, J. French, of St. Louis, was the winner, and G. P. Dorris, of St. Louis, second.

The South Jersey Mobile Transit Company discontinued their line of wagonettes between Bridgeton and Salem on August 9. The distance, 18 miles, and the heavy roads were found too great a strain upon the engines.

Complaints have been made alleging irregularities in the observers' reports of the Chicago endurance contests. Detours are said to have been made to avoid reaching the controls ahead of time, and at least one car came to a standstill without any mention being made in the official reports.

A. H. Funke, agent for the Kelecom motors, has ordered a bicycle equipped with a 2¼ horse power Kelecom motor, which he will enter in the 10 mile motor bicycle handicap road race, to be held under the auspices of the New York Motor Cycle Club and the Associated Cycling Clubs of Long Island on Ocean boulevard, Brooklyn, September 1, 1902.

Congressman Fletcher, of Minnesota, says that the Government abandonment of the automobile as a vehicle for delivering the mails was by no means permanent, but was simply done to give the manufacturers of the machine more time to perfect certain devices that would simplify the work. The experiments in Minneapolis with the automobiles were satisfactory in a number of particulars, and the Government is anxious to continue them at the earliest moment. Further experiments probably will be made at a near day.

The county board of freeholders of Atlantic City, N. J., have decided to build a new road between Atlantic City and the mainland. It will be 100 feet in width and consist of a heavy bed of sand, topped with a thick coat of gravel. The cost will be about $80,000, one-third of which will be paid by the State.

The scorching automobilists are now to be ostracized by society, according to newspaper reports.

The American Automobile Club of Pueblo has recently been formed at Pueblo, Col., with ten members and Dr. H. B. Oertel as president.

Early morning rides into the country are said to have become extremely popular with chauffeurs and their friends in Buffalo. This form of recreation promises to grow in popularity, for it is a health giving sport.

A. L. Prescott, of the Prescott Automobile Manufacturing Company, and his daughter have just completed a drive in one of the company's steam carriages from Passaic, N. J., to Poplar Tavern, North Newry, Me.

The Berkshire Automobile Club has received an invitation to Albany for their next run, where they would be entertained by the organization in the capital city, and the matter will be decided at a meeting to be held soon.

The Berkshire Automobile Club, of Pittsfield, Mass., has just had made a club pin. It represents the wheel of an automobile. The tire is silver and the hub of gold. On red enamel is the inscription "Berkshire Automobile Club."

A. W. King, of Maywood, N. J., superintendent of the Automobile Company of America during the last year, has severed his connection with that company and has been engaged by another company soon to launch out in the automobile business.

The trustees of the New England Electric Vehicle Transportation Company will soon declare a dividend in liquidation of $1 per share. The final dividend in liquidation is not expected to be in excess of 25 cents. The above dividend of $1 will make a total of $3.50 per share paid on 225,000 shares.

The Automobile Touring Club has been organized and has secured stables at 133 to 139 West Thirty-eighth street, New York. It is the club's intention to rent high grade touring cars by the hour, day, week or month and to arrange long or short distance tours. Louis J. Harris is manager.

The contest committee of the A. C. A. in their recently published report of the 100 mile endurance contest held on May 30 last suggest that in future contests some other than a holiday be selected for the event. On holidays there are likely to be parades, and on such days the highways are more largely used by the general public.

We are informed by A. H. Funke that the Kensington Automobile Manufacturing Company, of Buffalo, N. Y., have turned out a tonneau carriage with a 11 horse power double cylinder Kelecom motor, and have made a run of 104 miles at 20 miles an hour, which is a good average for a

tonneau car; they also made a mile in 1.46, and if the car was geared higher could have gone faster.

The Smith Storage Battery Company, of Binghamton, N. Y., filed a certificate of the payment of half the capital stock of $100,000 on August 11 in the county clerk's office at Binghamton.

The Long Island Automobile Club will hold a series of races at the Brighton Beach race track on next Saturday at 2 p. m. The program consists of ten contests and a number of exhibitions.

The N. A. A. M. has published a reprint of an article by T. A. Edison in a recent number of the *North American Review* and an article by a member of the association commenting on the above article by Edison (Bulletin No. 4).

General opposition is being made in Bridgeport, Conn., to the erection of a new automobile station in the centre of the business district in place of the station recently burned down. A letter was received by the club, signed by adjoining property owners, who object to the establishment of a station on State street, near Park avenue, which is one of the sites at present under consideration.

New York-Boston Rules.

The committee in charge of the "reliability run" between Boston and New York, which will be held under the auspices of the Automobile Club of America, beginning October 9, has made a decision on the "repair" question. Only such minor repairs will be allowed as may be customary under ordinary touring conditions. Contestants will not be allowed to replace boilers, axles, engines or wheels. When the cars arrive at the night control they must be filled with gasoline and water, and no other attention can be given to the machines that night. The cars will be turned over to the owners the next morning at 7 o'clock, and they will have until 9 o'clock, the time of the official start, to make minor repairs. If the cars are not ready at 9 o'clock overtime will be charged.

Entries for the Brighton Beach Races.

Following are the entries received up to Saturday noon, August 16, for the race to be held next Saturday on the Brighton Beach Track:

60 horse power Mors, Homan & Schulz.
60 horse power Mors, A. J. Levy.
40 horse power Panhard, R. A. Rainey.
40 horse power Mercedes, H. F. Harkness.
35 horse power Darracq, Chas. D. Cooke.
16 horse power Mors, W. W. Beach.
10 horse power De Dion Racer, Jacques Louvegnez.
16 horse power Peerless, Peerless Manufacturing Company.
Howard Steam Racer, Howard Automobile Company.
Cannon Steam Racer, George C. Cannon.
Locomobile, Thos. Holden, Jr.
Locomobile, L. E. Holden.
Locomobile, L. A. Hopkins.
8 horse power De Dion, L. R. Adams.
8 horse power De Dion, Mr. De Cotta.
3½ horse power Crestmobile, C. W. Spurr.
8 horse power Waltham Manufacturing Company, Albert Reiner.
7 horse power Buffalo, Sidney Bowman.
15 horse power Winton, Percy Owen.
15 horse power Winton, H. C. Smith.
9 horse power Haynes-Apperson, H. S. Chapin.
7 horse power Oldsmobile, R. M. Owen.
Waverley Electric, F. N. Nutt.
Columbia Electric, L. A. Hopkins.
7 horse power Northern, Homan & Schulz.

The Long Island Automobile Club has representatives in Saratoga and Newport, but up to Saturday night nothing had been heard from them. They are expected to return on Tuesday, with results and blanks signed.

Automobile Accidents.

A steam delivery wagon of a packing house in Harlem was destroyed by fire on the street on August 12.

The son of Deputy Collector Ball was severely injured by an automobile at Newport, R. I., on August 4.

The automobile of Harvey T. Weeks, of Chicago, caught fire on Ashland boulevard on August 3. Firemen extinguished the flames.

An automobile belonging to John N. Maher was wrecked at St. Louis July 8 by a collision with a street car. Maher jumped from the vehicle and escaped unhurt.

C. H. Lindenberg was thrown out of his machine on August 4 at Columbus, Ohio, and sustained injuries. The accident was caused by one of the axles breaking at the hub.

E. A. Randolph lost control of his machine on August 4 on Mendham Hill, near Morristown, N. J. He leaped from the vehicle and let it run down hill, where it was upset.

Bernard Pratt and Col. T. A. Garrigan, of Cincinnati, ran into a team of mules near Huntington, W. Va., on August 2. It is said that the occupants of the machine were bruised.

An automobile owned and operated by R. D. Markham ran into a wagon laden with fruit trees near Evanston, Ill., on August 7. The machine and wagon were wrecked and the operator was thrown out and bruised.

On the afternoon of August 1, near Ackley, Ia., S. D. Greuning and H. H. Nazett took a spin in the country with their automobile. When some four or five miles out, and going at a rate of nearly 20 miles per hour, they struck the end of a culvert, throwing the occupants about 50 feet and smashing the machine. Mr. Nazett was not injured, but Mr. Breuning received injuries about the head, shoulders and hips that will lay him up for some time.

Myron Gaylord drove into Laingsburg, Mich., with a lady on August 1. The latter's skirt caught in a lever when she was stepping out and the carriage ran away and was wrecked.

A collision between a street car and a light gasoline carriage of B. A. Legros occurred at Toledo, Ohio, on July 29. The damage was slight, as only the right front wheel of the automobile was broken and the front axle slightly bent.

An automobile occupied by D. H. Harris and Edward White, of New York, ran down an embankment near Sag Harbor on the night of August 1 while it was very dark. No serious damage seems to have been done, although the vehicle upset.

An automobile driven by Charles L. Symonds, of Nahant, was struck by a train of the Boston and Maine line at Lynn, Mass., at 10:05 p. m. August 2 and demolished. The driver escaped by jumping. It is thought he lost control of the machine.

An automobile with seats for eight people which was hired by C. H. Pettingill at Hartford, Conn., August 3, was wrecked 2½ miles from Unionville. It is stated that the power gave out when near the top of a hill and the machine ran back down hill. Only one of seven occupants was hurt.

J. L. French, of the St. Louis Motor Carriage Company, had a collision with a street car in Pittsburg August 11 while driving a prospective customer in a new vehicle. The automobile was badly wrecked and the two occupants injured. It is said that the motorman of the car was to blame for the accident.

The eastbound twenty hour train between Chicago and New York, on the Pennsylvania Railroad, struck an automobile occupied by W. B. Hoff and Harry Kitchen at the Fifth street crossing in Upper Sandusky, Ohio, on August 10. Both occupants jumped and escaped, but the machine was completely wrecked.

W. K. Vanderbilt had an accident in France a fortnight ago while he was driving from Chartres to Paris in his "Paris-Vienna" type Renault. The accident is described thus: Mr. Vanderbilt was overtaken by a racing Mors, driven by a friend and found himself for the moment enveloped in dust, which also hid from his view a cart that was drawing near, driven by a country woman. There were cries, a bit of adroit steering, which minimized the accident, and then a smash. Neither cart nor woman was hurt seriously; Mr. Vanderbilt was bruised slightly about the arms and legs, and his Renault was minus a wheel. When he had picked himself up the millionaire handed a roll of bank notes to the country woman.

List of Automobile Owners as Filed in the Office of the Secretary of State at Albany, N. Y.

(Continued.)

Masury, John W., 2 West Seventy-first street, New York city.
Morris, Dave H., 68 Broad street, New York city.
Milliken, Foster, 11 Broadway, New York city.
Moore, Louis W., Watertown, N. Y.
Martin, T. J., 279 North street, Buffalo.
Maxwell, John, Oneida, N. Y.
Minor, John C., 65 West Seventy-third street, New York city.
Morrill, Robert L., 27-29 Pine street, New York city.
Mills, J. B., Bristol, R. I.
Matthes, C. H., 64 Lodge street, Albany.
Mandery, Joseph J., Hotel Livingston, Rochester.
Melvin, David N., Linoleumville, Staten Island, N. Y.
Morschauser, Charles, 89 Cannon street, Poughkeepsie.
Mark, H., Herkimer, N. Y.
Morton, Edwin W., White Plains, N. Y.
Mason, Fred. E., 94 Exchange street, Rochester.
Millington, Chas. S., Herkimer, N. Y.
Metcalfe, Henry, 143 Liberty street, New York city.
Miller, F. M., 143 Court street, Binghamton.
Mabey, Fred. G., 146 Genesee street, Auburn, N. Y.
Meldrum, H. A., 767 La Fayette street, Buffalo.
Morrow, James, Fulton, N. Y.
Mooney, Henry W., 26 West 121st street, New York city.
Marceau, Theo. C., 258 Fifth avenue, New York city.
Marsh, W. G., Cattaraugus, N. Y.
Marcy, V. Everit, 68 Broad street, New York city.
Moore, G. W., Gilderland avenue, Mount Pleasant, N. Y.
Macy, F. H., 17 West Forty-seventh street, New York city.
Morrill, Frank T., 17-31 Vandewater street, New York city.
Maxim, Hiram P., Pittsburgh, Pa.
Miller, Jesse F., Sonyea, N. Y.
Mitchell, G. B., 24 West Tenth street, New York city.
Moore, James M., M. D., 375 Madison avenue, Albany.
Mason, George C., University Heights, New York city.
Millen, Thomas, 106 West Fifty-first street, New York city.
Morrow, A. P., Elmira, N. Y.
Millen, George S., 42 Lind avenue, New York city.
Maguire, J. H., Salem, N. Y.
Mangin, Frank, Jr., care Police Department, 300 Mulberry street, New York city.
Muir, T. Hood, 623 Eleventh street, Brooklyn.
Mead, D. Irving, 350 Fulton street, Brooklyn.
Maltby, D. F., 615 Lexington avenue, New York city.
Mertz, William W., Torrington, Conn.
Mott, C. S., 371 Genesee street, Utica.
Mundy, Harry H., 206 Genesee street, Utica.
Miller, Francis P., 206 Genesee street, Utica.
Martin, J. B., Hotel Martin, New York city.
Miller, Geo. N., The Grove, Rhinebeck, N. Y.
McMillan, G. N., New London, Conn.
McConihe, Alonzo, Troy, N. Y.
Macdonald, James V., 323 West Eighty-ninth street, New York city.
McGarvey, Alden, Thurlow Terrace, Albany.
McHenry, A., Hornellsville, N. Y.
MacNutt, Barry, Bethlehem, Pa.
McCabe, James M., Canandaigua, N. Y.
MacCracken, George G., University Heights, New York city.
McKee, A. Hart, Mamaroneck, N. Y.
McKinney, Andrew, 52 Broadway, New York city.
McGarvey, David, Thurlow Terrace, Albany.
McCog, James G., Manhattan Club, New York city.
McCord, William H., 100 Broadway, New York city.
McMurtry, George G., Great Neck, N. Y.
MacCormac, Paul, Buckingham avenue, Poughkeepsie.
MacDonell, A. M., 20 Trust Building, Rochester.
McClellan, F. W., Schenectady, N. Y.
MacDonald, J. Oliver, 23 Garrison street, Paterson, N. J.
MacDonald, Dr. George A., 31 East Sixty-seventh street, New York city.
McGregor, B. B., 26 Broadway, New York city.

Northrup, James A., Johnstown, N. Y.
Norton, W. P., 33 Wall street, New York city.
Neumoegen, Manfred L., 2 and 4 Wall street, New York city.
Nason, Carleton W., 71 Beekman street, New York city.
Newton, W. H., & Son, Cortland, N. Y.
Nellis, H. C., Auburn, N. Y.
Niles, Robert L., Fordham Heights, New York city.
Norrie, A. Gordon, 156 Fifth avenue, New York city.
Nuttall, John A., Cohoes, N. Y.
Newell, John, 273 Quail street, Albany.
Newell, Chas. Z., 397 Warburton avenue, Yonkers, N. Y.
Norwood, Paul, Ansonia, Conn.
Newcomb, Grant, 8 and 10 Union street, Albany.
New York and Queens Electric Light and Power Company, 85 Borden avenue, Long Island city.

Oltrogge, John F., 36 Rutland road, Brooklyn, N. Y.
Olyphant, R. M., Jr., 3 East Sixty-ninth street, New York city.
Osterhoudt, R. B., Kingston, N. Y.
Osborn, Samuel A., 335 Eighth street, Brooklyn, N. Y.
Osborn, William F., 1 West Eighty-first street, New York city.
Osborne, Hettie Starin, Princes Bay, Staten Island, N. Y.
Ozmun, I. Davis, 35 South Clinton street, Rochester.

Peck, George, 926 North Broad street, Elizabeth, N. J.
Predmore, C. V., 19 James street, Middletown, N. Y.
Pidgeon, Edward, Northport, Long Island, N. Y.
Plummer, Franklin A., 152 Madison avenue, New York city.
Pink, Godfrey R., 250 East Seventy-second street, New York city.
Page, Charles M., 318 Madison avenue, Albany.
Pruyn, Van B., 42 Main street, Oneonta, N. Y.
Pratt, John T., Glen Cove, N. Y.
Purdy, Sylvanus, 31 Court street, White Plains, N. Y.
Peon, Nicholas E., Hotel Victoria, New York city.
Potter, G. C., Johnstown, N. Y.
Phillips, Augustus, Kingston, N. Y.
Pierce, V. M., 663 Main street, Buffalo, N. Y.
Pohl, George D., Vernon, N. Y.
Proctor, William Ross, 344 Sixth avenue, Pittsburg, Pa.
Proal, P. A., 45 Broadway, New York city.
Pitkin, A. J., 816 Union street, Schenectady, N. Y.
Peck, Alfred L., 138 Fifth avenue, New York city.
Peabody, George Foster, 27 Pine street, New York city.
Painter, C. G., 145 Forty-first street, Brooklyn, New York.
Powers, Walter W., 101 Powers Building, Rochester.
Patterson, Charles E., 33 Monroe place, Brooklyn.
Price, H. C., Centre Moriches, N. Y.
Pick, Alfred R., New York city.
Perkins, Stephen P., Chicopee, Mass.
Perry, W. Talbot, 57 West Seventy-fifth street, New York city.
Pettengill, George B., Century Club, Cleveland, Ohio.
Prouty, Phinehas, Bryn Mawr, Pa.
Parmenter, William Hale, 1135 Broadway, New York city.
Phyfe, Olive Lanah, care The Barnard, New York city.
Pierce, R. V., 663 Main street, Buffalo.
Post, George B., Jr., 15 Broad street, New York city.
Proctor, C. E., Carnegie Studio, New York city.

Rianhard, Dane E., New Brighton, N. Y.
Robe, Richard H., Albany, N. Y.
Robinson, F. G., Albany, N. Y.
Rexford, Andrew W., Schaghticoke, N. Y.
Redfield, Amelia F., 59½ Kemble street, Utica.
Rice, E. W., Jr., Schenectady, N. Y.
Robinson, Karl F., 442 Clinton avenue, Albany.
Reed, Chas. L., 10 Anson place, Rochester.
Roberts, Myron F., Rupert, Vt.
Russell, Worthington S., Highland Mills, N. Y.
Roberts, H. Morton, Herkimer, N. Y.
Regan, Thos. J., 871 Fifth avenue, New York city.
Rochester Steam Motor Works, Rochester, N. Y.
Rogers, Belden J., 308 Third avenue, New York city.
Rudderow, Edward D., 145 West Eighty-eighth street, New York city.
Rose, Hugh L., Geneva, N. Y.
Riglander, M. M., 140 West 104th street, New York city.
Richard, Oscar L., 46 East Seventy-second street, New York city.
Reynolds, William E., Passaic, N. J.
Randall, Fred. M., Ripley, N. Y.
Rockefeller, William, 689 Fifth avenue, New York city.
Richards, E. J., Mechanicsville, N. Y.
Reynolds, W. G., 196 Lark street, Albany.
Rowan, Archibald H., Grand Central Station, New York city.
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Runyon, Frederick T., 745 High street, Newark, N. J.
Ripley, Sidney D., Hempstead, Long Island, N. Y.
Roe, Nathaniel, Patchogue, Long Island, N. Y.
Richardson, Beatrice, 109 West Seventy-fourth street, New York city.
Robinson, H. E., 433 Classon avenue, Brooklyn, New York.
Rhoades, Mrs. Pauline, South Broadway, Tarrytown, N. Y.
Rollinson, C. F., 590 Richmond avenue, Buffalo.
Robertson, John A., 867 East Main street, Rochester.
Raczek, Louisa, Brooklyn, New York.
Roosevelt, J. Roosevelt, Hyde Park, N. Y.
Rogers, William S., 200 West Fifty-sixth street, New York city.
Richards, F. M., Alexander, N. Y.
Reick, William C., 318 West Seventy-seventh street, New York city.
Ryan, Harris J., Cornell University, Ithaca, N. Y.
Reed, Waldo S., 28 Knickerbocker road, Englewood, N. J.
Robison, William, 18 Wall street, New York city.
Riker, A. P., 200 West Seventieth street, New York city.
Roesler, August, 141 Broadway, New York city.

Smith, E. H., 79 Pierrepont street, Brooklyn, New York.
Stokes, Walter C., 28 East Fifty-eighth street, New York city.
Seward, J. Perry, 200 West Seventieth street, New York city.
Smith, Coe D., Smithtown Branch, N. Y.
Spencer, William, 232 Lincoln place, Brooklyn.
Scott, John M. N., Perth Amboy, N. J.
Struss, Henry W., 231 East Forty-second street, New York city.
Storm, Francis F., Jr., 232 East Eighteenth street, Brooklyn, New York.
Scott, H. R., Binghamton, N. Y.
Schoonmacher, F. S., 139 West Thirty-eighth street, New York city.
Shriver, Harry T., 333 East Fifty-sixth street, New York city.
Silliman, Frank, Jr., Scranton, Pa.
Stewart, John, 147 West Ninety-fourth street, New York city.
Schulz, John D. H., 267-271 Grand street, corner Roebling, Brooklyn, New York.
Shacklady, C. E., corner Fulton and Fifth avenue, Troy, N. Y.
Schulz, Theo. E., 161 East 116th street, New York city.
Stephanie, Ph. F., 240 Midland avenue, Syracuse.
Scott, George I., 28 West Fifty-seventh street, New York city.
Sondern, Frederick E., 200 West Fifty-sixth street, New York city.
Simpson, Alfred L., 32 Broadway, New York city.
Spalding-Bidwell Company, 29 West Forty-second street, New York city.
Shafer, Myron, 217 West Seventy-ninth street, New York city.
Sauer, George J., 250 Willis avenue, New York city.
Smith, Walter, 403 Centre street, South Orange, N. J.
Saul, Chas. R., 149 Columbus avenue, New York city.
Sternberger, Edwin, 43 East Sixtieth street, New York city.
Staires, G. Barry, 20 Cortlandt street, New York city.
Smith, Wilson R., Broadway and Thirty-first street, New York city.
Smith, Rensselaer J., 144 Lancaster street, Albany.
Swift, Chas. I., Millbrook, N. Y.
Shafer, M. F., 186 East Main street, Rochester.
Sedgewick, A., 149 Academy street, Poughkeepsie.
Smith, R. A. C., 12 West Seventy-second street, New York city.
Stivers, E. A., 5 East Twenty-seventh street, New York city.
Stern, Louis, 993 Fifth avenue, New York city.
Story, Jeremiah T., 134 Broadway, New York city.
Sutro, Lionel, 25 Broad street, New York city.
Stewart, W. H., 105 John street, New York city.
Sexsmith, G. N., 719 Avenue C, Bayonne, N. J.
Smith, W. A., Fonda, N. Y.
Stephenson, Frank B., 199 Jefferson avenue, Brooklyn, New York.
St. Louis, L. H., Albany, N. Y.
Schoonmaker, W. H., 40 East Forty-second street, New York city.
Samuels, F. E., 122 East Fourteenth street, New York city.
Schuyler, J. O., Fonda, N. Y.
Storrs, Frank, Port Chester, N. Y.
Stewart, W. J., 8 Central avenue, Newark, N. J.
Sutton, John W., 645 Carroll street, Brooklyn, New York.
Smith, Edgar F., 1215 Tinton avenue, New York city.
Spencer, C. M., Windsor, Conn.
Senmans, Clarence W., Brooklyn, N. Y.
Spelmann, W. H., 48 West Twenty-second street, New York city.
Scott, Cyril, Bayside, L. I.
Smith, L. J., Syracuse, N. Y.
Sweet, William A., Syracuse, N. Y.
Stevens, Samuel B., Rome, N. Y.
Slack, John R., Steuben and North Pearl streets, Albany.
Slade, John, 66 Broadway, New York city.
Stevens, Sarah A., Rome, N. Y.
Shirley, Stanley, 301 Cable Building, New York city.
Scott, Walter A., 610 Pine avenue, Niagara Falls N. Y.
Slade, George T., 21 Cortlandt street, New York city.
Sedgwick, A. B., 149 Academy street, Poughkeepsie.
Schneider, Louis, Pleasant Valley, New York.
Schroeder, Henry, 213 South Parsons avenue, Flushing, N. Y.
Starks, D. L., Far Rockaway, N. Y.
Sherman, George K., Western Hotel, Saratoga Springs, N. Y.
Spencer, C. C., Cortland, N. Y.
Stern, Charles, 13-21 Mumford street, Rochester.
Spelman, William H., 432 Sixth street, Brooklyn, New York.

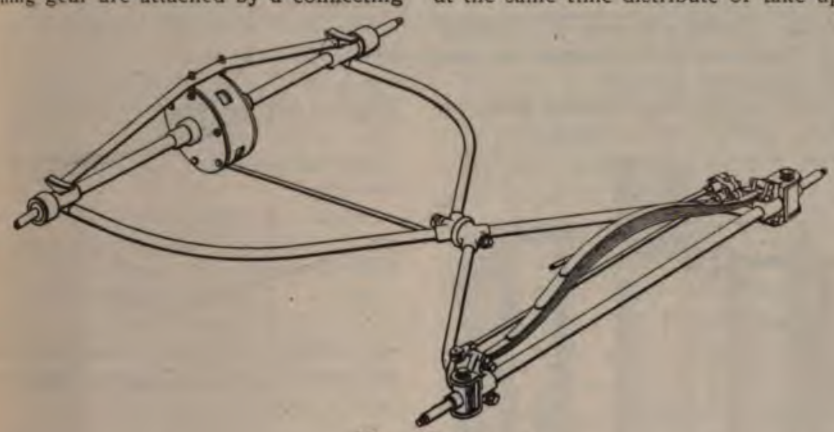
(To be continued.)

MOTOR VEHICLE PATENTS..

United States Patents.

706,534. Vehicle Frame.—James Dawson, of Rochester, N. Y. August 12, 1902. Filed May 22, 1901.

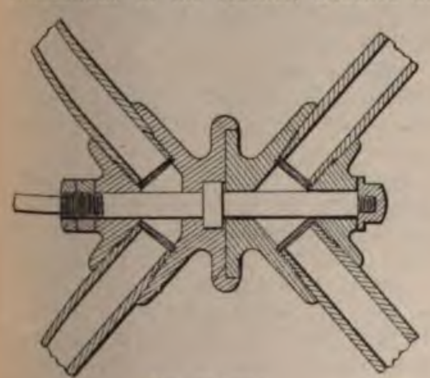
The forward and rear portions of the running gear are attached by a connecting



No. 706,534.

frame, in which is arranged a swivel, whereby an independent tilting movement is permitted the forward and rear wheels to accommodate them to the irregularities in the road bed without straining other parts of the machine.

Reaches in the form of tubes are attached to the rear journal boxes, and their forward ends united in a bracket having a vertically extending face, surrounded upon its outer edge by a rim. Bearing against the latter is a similar swivel member, from which extend diverging tubes forming continuations of the reaches, attached at



No. 706,534.

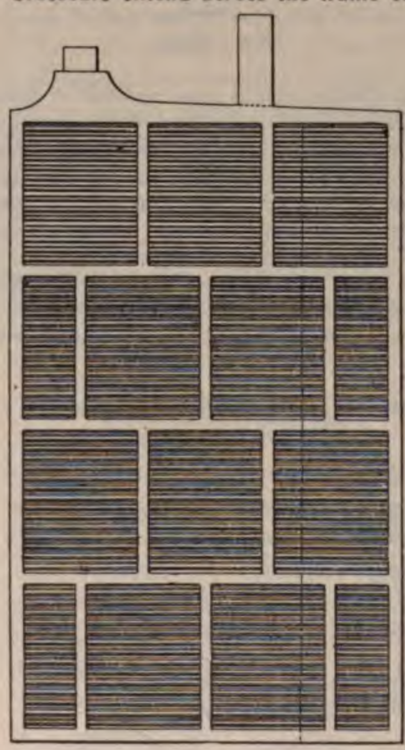
their outer ends to the yokes on the ends of the front axle. The swivel members and the two parts of the frame thus formed are united by means of a bolt, provided with a collar and rigidly secured to the rearward member by a nut, its outer end forming a bearing for the forward member, which is secured against removal by a nut, the advantage of this construction being that the forward and rear portions of the frame may be detached by simply removing a nut, the bolt forming a rigid stud or projection on one of the swivel connections.

706,568. Electrode for Storage Batteries.—Charles W. Kennedy, of Rutledge, Pa. August 12, 1902. Filed July 30, 1901.

The invention relates to that class of electrodes for storage batteries in which the active material is formed directly upon the lead plate by electro-chemical action, and aims at improvements in such electrodes whereby to increase the amount of active surface, insure greater efficiency, and at the same time distribute or take up the expansion occurring during the "forming" period, providing a plate in which the "formed" active material will be positively supported.

The frame of the electrode, which is rectangular in form, consists of side, top and bottom pieces. The top piece is provided with projections, by which connection may be made with other electrodes during the forming period, and when assembling the same in a battery.

Crossbars extend across the frame connecting the side pieces and vertical members connect the crossbars and the top and bottom pieces. The vertical members "break joint," so to speak, with each other.



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Within each space or recess of the frame of the electrode formed by the crossbars and the vertical members are arranged the lead strips forming the active material. In the present instance these strips are arranged in sets or groups of three—viz., a supporting strip, roughened, knurled or corrugated, so as to provide a retaining surface for the peroxide of lead formed by electro-chemical action, and films disposed on either side of the supporting strips. The films are perfectly smooth and are considerably thinner than the strips. They are kept in contact with the strips during the building up of the electrode, and during the forming process these thin films are reduced to peroxide of lead, which deposits upon the lead strips.

706,590. Vehicle Tire.—F. E. Osgood and F. F. Bradley, of Chicago, Ill. August 12, 1902. Filed February 17, 1902.

In close contact with the inner surface of the outer covering of rubber is a protecting and strengthening layer formed of canvas which serves as a casing for the inner part of the tire and to prevent the penetration of sharp objects through the same into the interior of the tire. The space within the protecting layer is filled by a resilient and porous material—such, for instance, as sponge rubber—the interstices of which are filled with gas under tension, thereby imparting to the tire the desired resiliency, at the same time maintaining the same normally distended.

The preferred method of constructing the tire is to locate within the protecting

No. 706,590.

layer a mass of material insufficient to completely fill the space within the tire, after which the protecting covering and the outer covering are closed. The core consists in a material capable of being expanded and then retained permanently in such expanded condition—as, for instance, uncured sponge rubber stock. The uncured sponge rubber stock prior to being closed within the tire is mixed with a chemical capable of being decomposed, so as to form a gas when subjected to heat.

Ammonium carbonate is capable of giving good results. After the core has been enclosed within the outer covering the tire is subjected to the degree of heat neces-

sary for vulcanization of the rubber, which decomposes the chemical, thereby liberating a gas which expands throughout the interstices of the core and is confined in the innumerable separate cells throughout the expanded core. During the process of vulcanization the outer covering surrounding the core does not expand. Consequently the initial exterior diameter of the tire remains the same when it is finished. Prior to inserting the core C within the outer covering of the tire it is preferably so formed as to have a circular cross section, the diameter of which is enough smaller than the interior diameter of the completed tire to permit the core to expand when the gas is liberated from the chemical during the vulcanizing process sufficiently to completely fill the interior space of the tire.

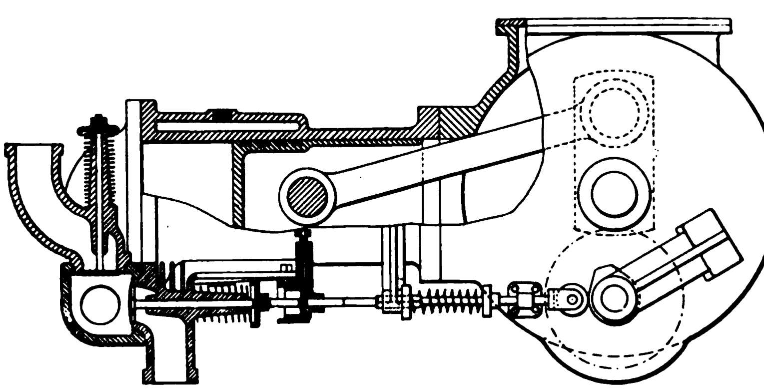
706,636. Exhaust Muffler.—Robert E. Bonsfield, of Bay City, Mich. August 12, 1902. Filed October 8, 1900.

706,733. Four Cycle Explosive Vapor Engine.—Gustaf Erikson, of Södertelge. Sweden. August 12, 1902. Filed October 9, 1901.

The invention relates to a regulator for explosive engines acting on the exhaust. To the stem of the exhaust valve is fixed a piston working in a cylinder forming a dash pot. When the valve is lifted air is admitted to the dash pot behind the piston by a port in the side of the cylinder controlled by the piston itself. As the valve closes, under the force of its spring, the air is forced out of the dash pot through a passage controlled by a valve.

The means employed for opening the exhaust valve are such as to permit the latter to close under normal conditions or without a dash pot when the engine is on the dead centre. The closing period of the exhaust valve is intimately connected with the cycle of operations within the motor, since the automatic admission valve cannot open during the suction stroke until the exhaust valve is closed and a vacuum has been subsequently formed. Before the closing of the exhaust valve the waste gases are drawn back into the cylinder in quantity determined by the shorter or longer closing period of the exhaust valve. The quantity of explosive mixture subsequently drawn in is thus made dependent on the quantity of waste gases previously drawn back—that is, on the relation of the closing moment of the exhaust valve to the beginning of the suction stroke.

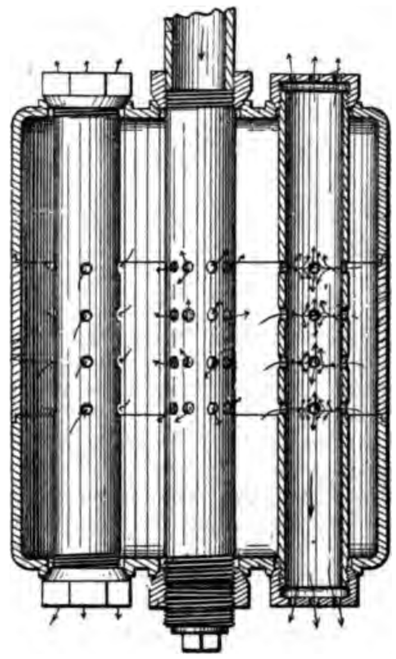
By using a device for controlling the closing period of the exhaust valve it is possible, first, to vary the power of the engine while retaining a constant velocity; second, to vary the velocity of the engine under a constant load, and, third, to obtain automatic governing control of the power and velocity of the engine according to the variations in load.



No. 706,733.

706,844. Muffler.—Homer N. Motsinger, of Pendleton, Ind. August 12, 1902. Filed September 23, 1901.

In this muffler the exhaust gases are first divided into a large number of small streams, which are directed in opposing or converging lines, so that each stream will be met by a substantially equal and practically directly opposite stream, each pair of coacting streams butting "head on" into a chamber, from which the gases are then allowed to escape. By this means the velocity of egress is checked, the chambers into which the said opposing streams discharge being in area much greater than the area of the exhaust pipe from which the gases are received.



No. 706,844.

The muffler is composed of a pair of heads with similar sets of openings, through which extend pipes provided with means for clamping the heads together and the pipes in position. A pair of aligned openings are made in the wall of each of these pipes.

706,882. Automobile. — Madison F. Bates, of Lansing, Mich. August 12, 1902. Filed June 14, 1902.

The object of the invention is to render the mechanism more accessible in vehicles in which it is located within the body. To this end the body is pivoted at one side to the vehicle frame and can be swung around these pivots to get at the machinery.

705,209. Variable Speed Device.—Walter E. Crane, of Denver. July 22, 1902. Filed November 24, 1900.

705,176. Vehicle Wheel.—Charles H. Wheeler and Franklin W. Kremer, of Akron, Ohio. (Wheeler assignor to India Rubber Company.) July 22, 1902. Filed May 4, 1900.

705,175. Vehicle Tire.—Charles H. Wheeler and Franklin W. Kremer, of Akron, Ohio. (Wheeler assignor to India Rubber Company.) July 22, 1902. Filed July 16, 1901.

706,611. Variable Speed Gearing.—Clarence Stone, Philadelphia, Pa. August 12, 1902. Filed December 21, 1901.

706,637. Reversing Gear for Engines.—Victor W. Clough, Geneseo, Ill. August 12, 1902. Filed March 3, 1902.

706,638. Reversing Gear for Engines.—Victor W. Clough, Geneseo, Ill. August 12, 1902. Filed March 3, 1902.

706,659. Elastic Steel Spoke for Vehicle Wheels.—Henry G. M. Howard, Kalamazoo, Mich. August 12, 1902. Filed December 30, 1901.

706,664. Differential Speed Power Transmitting Mechanism. — Samuel Jackson, Fayetteville, N. Y. August 12, 1902. Filed July 5, 1901.

706,667. Reversing Gear.—Lyman R. Jones, Coscob, Conn, assignor to Charles A. Freeman, South Norwalk, Conn. August 12, 1902. Filed March 20, 1902.

706,859. Sparker for Explosive Engines.—Harry H. Segner and Charles B. Segner, Hagerstown, Md. August 12, 1902. Filed September 13, 1901.

706,864. Motor Propelled Lawn Cutter and Roller.—William P. Simpson, Overbrook, Pa. August 12, 1902. Filed March 14, 1901.

706,916. Fuel Valve for Gas Engines.—Jess B. Fenner, Buffalo, N. Y. August 12, 1902. Filed October 26, 1901.

706,932. Valve Mechanism for Explosive Engines.—Rasmus P. Hansen, Erindslev Sogn, Denmark. August 12, 1902. Filed May 4, 1899.

706,978. Motor Vehicle. —Harry J. Marks, New York, N. Y. August 12, 1902. Filed September 25, 1901.

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American Tires Abroad.

The article from the London *Engineer* printed in our last issue calls attention again to the market possibilities for American tires in Europe. During the last few years a number of American automobile tires have been placed upon the English market, mostly of the single tube and semi-pneumatic variety, which seem not to be manufactured abroad. And it can be recorded with satisfaction that most of these tires have been quite successful over there. It is particularly worth noticing that the luxuriously equipped car recently built to the order of the King of England is fitted with American tires, which were accepted only, so it is reported, after convincing tests had been made of their reliability. It need hardly be mentioned that the patronage of royalty carries with it considerable advertising value abroad, and that the order for the tires was secured by an American manufacturer should be cause for congratulation, not only to the particular manufacturer but to the entire tire industry of the country.

To those tire manufacturers who wish to extend their market, and who have confidence in their goods, an opportunity will soon present itself to bring their wares before the automobile public in England. We refer to the contest of tires which has been organized by the Automobile Club of Great Britain and Ireland, and which will be held next month. Such a test of tires is something of a novelty, and as the item of tires largely affects both the pleasure and the expense of automobiling the interest of both automobile owners and manufacturers is assured.

We hope to see a considerable number of American tires competing in this contest and—to make the best possible records.

Why Not a Mutual Insurance Organization?

The apathy of the insurance companies toward automobiles seems to be on the increase. The companies who assume these liabilities are constantly growing less in number and those who do write policies for automobiles are constantly increasing their rates.

A conference of automobilists was held at Saratoga a short time ago at which this question was discussed. Several insurance brokers were in attendance. It appears from the reports of this conference that automobilists who wish to have their policy cover fire risks while touring can only get a policy for the amount of one-third the value of their car, while for risks in New York city alone policies for one-half the value of the cars are issued.

When the demand for insurance on automobiles first made itself felt several of the insurance companies issued policies at the regular rate for the contents of the buildings in which the vehicles were kept, insisting only upon the clause that liability be restricted to loss by fire originating outside of the machine itself. However, when automobiles gained in popularity and an individual owner frequently had several machines this plan was found to be impracticable, as when a number of machines are stored together the clause limiting the liability to fires having their origin outside the machine insured is not practically applicable. For instance, if three machines were stored together and the place took fire from one machine, while the clause might exempt the company from liability on that one machine it would not affect their liability on the other two machines.

It appears from the report of the conference that the insurance companies have been put to considerable trouble in determining the fire risks of the different classes of machines. Electric vehicles are now classed as the smallest risk; gasoline vehicles next and steam vehicles last. But this simple classification hardly covers the case; for instance, if a steam vehicle use kerosene as fuel the fire risk would certainly be greatly lessened, while details of burner construction, etc., must also affect the safety of a steam carriage.

No doubt the complexity of the problem and the difficulty of dealing with it adequately have caused many of the insurance companies to abandon the field and others to fix the premiums at such an unreason-

able figure as to cause dissatisfaction and complaint among automobilists.

The need for insurance on automobiles will become greater as the movement spreads among the less wealthy classes, and the risks will simultaneously be reduced owing to the constant improvements in construction. There will thus evidently be a large business in automobile insurance in the future, and business as profitable as other branches of insurance. If the insurance companies decline the trouble of organizing this work, why can we not have an organization among automobilists for mutual insurance? Such an organization allied to, say, the A. A. A. should prove of the greatest benefit to the movement.

A similar movement is now on foot in France. For, although special companies have been organized there to conduct business in the line of automobile insurance, the experience of automobilists with them has been very unsatisfactory, and they have reached the conclusion that mutual insurance is the only remedy for the situation.

Irrational Use of the Horn.

The abuse of powerful signaling horns has perhaps done as much as anything to stir up opposition to the automobile in country and fashionable residence districts. Who has not at one time or another seen an automobilist speeding along the road at an illegal rate, continually tooting his horn as a signal for other road users to clear the way? The practice savors of a spirit of arrogance or domination, and is resented by all who are annoyed by it, the slowly proceeding automobilist as well as the horseman. There is certainly a vast difference between giving a simple signal to announce to the driver ahead your intention of overtaking him and the uninterrupted tooting, which to every road user has only the one meaning, "Get out of the way!" The question involved is one of ethics rather than of law, but one nevertheless of great import. When a road user keeps to his side of the road and there is plenty of room for other vehicles to pass he complies with all the requirements of the road laws in this respect. There is no occasion for the use of the signal horn under such conditions except to announce approach, and frequently that is entirely superfluous, as the peculiar noise of an automobile makes its approach discernible at a considerable distance. Continual tooting can only be construed by the party for whom it is intended as a provocation, and leads to estrangement between different classes of road users. Already such results are in evidence. Some teamsters, for instance, have become absolutely indiffe ent to the horn, and in some cases actually block the road in a spirit of spite or retaliation. And now the feeling prompting such action seems to spread from the teamster to the carriage owner, for, according to a report from Akron, Ohio, a prominent citizen there has ordered his coachman not to turn out for automobiles coming behind his carriage, impressing upon him that he has as much right to the streets as the automobilists, and that they have no authority to order him to get out of the way.

Fortunately this bad practice is confined to a comparatively small fraction of automobilists; but let those who are inclined to indulge in it remember that whatsoever they sow they shall reap, and that if they treat other road users in a provoking manner they may expect to be treated likewise.

Oppressive Speed Ordinances.

Oppressive speed regulation, trapping of the automobilists by the police and general opposition to the automobile have now become the vogue in the towns surrounding all the larger cities. Here it is particularly the Long Island towns that we hear from every once in a while as having passed a new automobile ordinance, or as having been the scene of arrest and prosecution of automobilists for reckless speeding. In the vicinity of Chicago the towns of Glencoe and Evanston have become notorious for the anti-automobile inclinations of their municipal governments, and in the Far West the town of San Mateo, in the vicinity of San Francisco, has just passed an ordinance which for its oppressive nature is probably without an equal in the country. Besides the usual requirements of brakes, bells and lights, the ordinance provides that "no person shall drive, guide or propel an automobile or other motor vehicle on any street, avenue or highway within the city of San Mateo, at a greater rate of speed than 5 miles per hour.

"Every person driving, guiding or propelling an automobile or other motor vehicle within the city of San Mateo, on arriving within 500 feet of any vehicle propelled by animal power, or of any person leading or driving a domestic animal, shall slow down to a speed not exceeding 2½ miles per hour. * * *"

Unless San Mateo is a so called "dead" town, vehicles propelled by animal power will ordinarily not be spaced much over 500 feet (nearly ⅛ mile) in its streets and avenues, and as under that condition the speed of automobiles is limited to 2½ miles an hour the board of trustees might have as well directly prohibited the use of such vehicles on the streets, as the effect must be the same. No automobile can possibly be used with advantage at a speed of 2½ miles an hour.

There certainly ought to be some way of stemming this adverse municipal legislation by co-operative action of automobilists throughout the country; and the time for action seems to have come. It should, first of all, be impressed upon the local authorities that automobiling is not synonymous with reckless driving and that by their oppressive speed regulations they hit the wrong party. The standpoint taken by the Cleveland Automobile Club and the North Shore Automobile Club is a step in the right direction. It is foolish to assume that town councils are not open to reason and are only governed by passion. The council of Wilmette, a town north of Chicago on the lake shore, which recently increased the speed limit for automobiles within the town limits to 12 miles an hour furnishes an instance of correct appreciation of the situation by a town council.

The Brighton Beach Races.

The midsummer speed contests held at Brighton Beach race track August 23 by the Long Island Automobile Club, while attended by a fair number of spectators, cannot be said to have scored heavily in public favor. Certainly no undue enthusiasm was apparent, and the crowd, which would have been an extremely small one for an ordinary horse race day, was apathetic and evidently tired with the long delay in beginning the events, as well as impatient at the tedious intervals between the races. In fact, the Long Island Club can hardly congratulate itself upon the success of its undertaking, and should realize in the future that affairs of this nature require able management and a close attention to detail, which were both conspicuously lacking in the affair of Saturday. The Cannon steamer, a vehicle of such peculiar general design that it would be difficult to find its particular sphere of usefulness, had been included officially as an entry; but when the announcer sound-

ed the call for the first event it was found that this machine was ineligible because requiring two operators—they sitting tandem fashion, one in front of and one behind the boiler, the front driver acting as steersman, while the rear man controlled the engine and brake. The rules of the American Automobile Association, under which the contests were held, include, in Rule 63a, a provision that the driver must have exclusive control of his automobile, and the stewards therefore very properly disqualified the Cannon machine. But the racing committee should have determined this question earlier and avoided the resulting delay and annoyance to contestants and spectators alike.

Design and Workmanship.

By Albert L. Clough.

Good design, good workmanship and good material are the three essential requisites of any mechanism, whether it be a clothes wringer or an automobile. If any one of this trinity of good qualities is absent, the mechanism is defective in a greater or less degree. An automobile, the general design of which is suitable for its purpose, is of no value if this design has been carried out in an unworkmanlike manner or with inferior material, and a machine which is of radically bad design cannot be effectually redeemed by any amount of mechanical skill or expensive material. There is, probably, the smallest glimmer of hope for the success of the poorly designed machine, even if it be of good workmanship, as its defects are radical and deep seated and are only remedied when the construction is so completely altered as to lose its individuality; but, nevertheless, it is probably true that the well designed vehicle if badly built, out of cheap materials, is nearly as unsatisfactory and productive of more of a certain kind of annoyance and disappointment.

The failures due to faulty design are definite and readily recognized and soon become well known and accepted as inevitable, while failures due to poor workmanship and bad material are unpredicable, sudden and particularly exasperating, as they seem to denote a dishonesty upon the part of the builder which is more blamable than is the ignorance which is manifested in a bad design. Failures due to bad material are either sudden and ruinous, due to breakages, or such as culminate in an early wearing out of the whole construction. Such failures are mostly disheartening, as they, too, savor of dishonesty. One can commiserate with a manufacturer for faults in his design, for after all the manufacturer is, on the average, no more advanced than "the state of the art," and he and the user are fellow sufferers together in the long and disappointing task of solving the problems of design which the conditions impose; but one cannot have, and should not have, the least charity for the manufacturer who puts out a machine showing bad workmanship or slovenly mechanics in its least part. There is excuse for a man who adopts a cylinder of too small bore for a carriage of a certain weight and gear, as the data which would guide him correctly is not yet available, but there is not the faintest extenuation for the man who, having designed his cylinder, should fail to bore it true or should send it out full of blow holes. A generally shared ignorance is excusable, but dishonesty in the construction of an expensive mechanism, upon the integrity of which life itself depends, is not.

If one has a vehicle with unduly short wheel base and short springs of a short period of vibration he soon learns that through a fault in design (for which no one may have been to blame at the time the machine was laid out), he can never expect to be able to make high speeds over rough roads with any comfort. He freely admits it, becomes resigned to the fact and drives accordingly, realizing all the while that here is a definite opportunity for improvement which he will look out for when he buys another rig. But if his running gear is put together with cheap carriage bolts that are constantly shearing off or losing their nuts, and if his springs begin to develop a permanent set under legitimate duty, he is far from being resigned, and "cusses" the manufacturer. One can put up with definite limitations of usefulness in any apparatus, but he cannot tolerate uncertainty and unreliability. Good mechanics know, and have known for generations, how to cut a good full thread that will hold a nut, and it is nothing but dishonesty to use pressed nuts and cheap stock bolts in important places—or anywhere—for all such fastenings are important. An automobile owner may have a carriage insufficiently supplied with radiators for cooling the motor during long runs. This is a fault in design and likely enough, when the vehicle was built, little data was at hand to guide the designer in proportioning his radiating surface. The operator of the vehicle simply resigns himself to stopping a little oftener for water, but he is filled with just indignation when his water tank springs a leak through faulty soldering, an absence of stay bolts or poor material; when one of the miserable garden hose menders drops off of one of the rubber connections and allows all the water to escape; when the rubber hose is chafed through by the motion of the springs with which it interferes, or when a badly brazed radiator gives way, for he knows that if a mechanic really wants to make an honest, strong tank he knows how to do so, and if assembling is carefully done there would be no interference of parts possible.

If a man buys a machine with an engine which is honestly constructed but which proves to be a less powerful vehicle than his purposes demand, he can at the most only question the judgment of the person who designed it, but if he discovers that his underpowered car is equipped with a motor having an oval cylinder bore, a piston that only touches on one side occasionally, and rings that refuse an intimate acquaintance with the cylinder walls, he mentally condemns that manufacturer to a fate similar to that prescribed by the Mikado for the unfair billiardist who was to play "on a cloth untrue with a twisted cue and elliptical billiard balls." And this is right, for an honest manufacturer will bore a cylinder true and make good fits. If he does not do this, he is a dishonest builder and deserves no consideration. There is no trick about it. It is simply honest mechanics.

It is not faulty design that has given the automobile its bad reputation and made it a synonym for fickleness and unreliability and a butt for the funny papers. The "state of the art" should not be made the scapegoat to bear the blame for the almost infinite amount of tinkering that is being done on the road and off. The blame should be put right where it belongs and be charged to the account of slovenly, unmechanical workmanship and a fondness for "stove bolt construction," and on the electrical side to a following in the footsteps of the electric bell hanger with his staples and tape.

There are in the market plenty of automobiles of proper design. There are very few of suitable material and workmanship. Anyone who has hopes of the future of the art may hope to live long enough to see a pleasure automobile constructed as is the locomotive (which is the synonym for good workmanship). The era of tinkering will then be at an end and not until then.

Automobile Sold for Charges by Repair Man.

The following announcement appeared in the Los Angeles (Cal.) *Journal* of August 13:

"Notice is hereby given that the following personal property, to wit, one gasoline automobile, will be sold at public auction, to the highest bidder, for cash, gold coin of the United States, on Monday, August 25, 1902, at 12 o'clock m., at my shop, 612 and 614 North Main street, Los Angeles city and county, State of California.

"Said sale will be made as aforesaid to satisfy my lien for $17.55, balance due me for work done and materials furnished in making, altering and repairing said automobile at the request of the owner or legal possessor of said personal property, S. B. Church; said work having been done in Los Angeles County more than two months previous to the date of this advertisement.

"R. C. Shepherd.

"Dated this 12th day of August, 1902."

View of the Grand Stand.

The Brighton Beach Races.

The automobile races held under the auspices of the Automobile Club of Long Island at the Brighton Beach track, popularly designated "The Track by the Sea," on Saturday, August 23, attracted a fair sized crowd to the course. The weather was fine all day long and there was but a light wind when the races were called. Twenty-five machines were entered in the ten events and seventeen of them reported to the officials. The five mile race for cars weighing over 2,000 pounds was called off, because but two machines had entered the event, a Darracq (36 horse power) and the Mercedes-Simplex (40 horse power). This proved to be a great disappointment to the people that occupied the benches of the stands.

The first race was called at 2:30 p. m., but the contestants did not go to the "post" until an hour afterward. All the starts were flying starts in all the races, with the exception of the Australian pursuit race, in which the vehicles had to make a standing start. Nevertheless, the time of the best first mile in that contest was very good. Between the events a number of exhibition miles were indulged in by the Cannon, Howard and Mercedes machines, in which the spectators took great interest. Later in the afternoon a match between the former two was to be held, but Mr. Cannon refused to have a brush with the Howard car, because of a leaky air tank and a leaky (live steam) nipple. Nevertheless, he smashed all the day's mile records against time shortly after.

The track would have proved to be an ideal one had it been banked. It had been carefully rolled, however, and was hard and smooth. To reduce the amount of dust the course had been sprinkled with water. Oil should have been used for this purpose. The Mercedes seemed to slew more than any other machine at the curves, which, by the way, were not true semi-circles and made steering troublesome. The operator of the Howard steamer invariably shut off steam more or less when approaching the turns, and lost headway on that account. To the writer it appeared that all the gasoline cars went into the curves with full power on. Only in one race was there any "jockeying" done before and near the starting post. That was in the "third heat" for gasoline vehicles. On crossing the starting line one of the contestants drove his machine over to the rail and right in front of the Peerless entry, which had the rail position. Mr. Mooers, the operator of the latter, applied the brakes immediately and all the cars were called back. The De Dion entry suffered on account of this, because its double cylinder motor had no water circulation, nevertheless it secured second place. At no time during the races, however, did the drivers take grave chances. There were no hairbreadth escapes and only wide "berths" were given when overtaking another chauffeur. In the 10 mile free for all race the Mercedes lapped one contestant twice

Chas. D. Cooke and F. A. La Roche in the Darracq Racer.

L. P. Mooers and C. J. Wridgway in the Peerless.

GEO. C. CANNON'S STEAMER AT SPEED.

other once. Two others left the ter completing but a 2 mile spin. ctators, hoping to see the Cannon- match, lingered until after 6 Many of them gave vent to their of disappointment, having ex- to witness some close finishes. The element was somewhat in evidence vate betting indulged in. Some of ere hopeful that the Winton and cars would compete side by side ast one of the events.

Cannon machine, in two mile ex- trials, made the respective fast 1:08 1-5 and 1:07 3-5.

Howard steam machine was dis- from entering the first event be- und to be over weight. But subse- in the 10 mile free for all race, it field for the first mile, running in of 1:15 1-5, also making a good in the pursuit race and further n exhibition mile in 1:09 3-5.

Darracq, operated by F. A. La proved exceedingly speedy, and ap- to run very freely. In the 5 mile gasoline vehicles between 1,000 0 pounds in weight it established ck records for each mile, doing the le in 1:24, thus clipping off 27¾ from the previous 1 mile record, ng the 5 miles in 6:42, as against ious record of 8:51.

e pursuit race, where, at starting, ward steamer, Darracq and Mer- implex were placed at equidistant apart, one-third mile from each round the track, all three ma- ppeared to hold their own for the miles, the superior horse power of cedes finally enabling it to over- nearer competitor, the Darracq, miles and quickly thereafter to e Howard at 5⅜ miles.

10 mile free for all race the Mer- mplex won first honors, covering tance in 11m. 54 4-5s., with the second, in 13m. 54 4-5s. The erless car performed very credit- created much favorable comment on account of its practical appearance and smooth operating qualities.

It won the second and final heats in its class, its times being, respectively, 1:39 1-5 and 1:38.

The obstacle race afforded a display of skill in operating automobiles and showed up some clever steering in following a circuitous path between barrels. This contest was won by a locomobile.

The summaries follow:

Vehicles Under 1,500 Pounds; mile heats.—First heat, for steam vehicles, won by Thomas Holden, Jr. (locomobile); L. E. Holden (locomobile), second; L. A. Hopkins (locomobile), third. Time—First, 2m. 1s.; second, 2m. 27 2-5s.; third, 2m. 31 2-5s. Won by 300 yards; second beat third 30 yards.

Second heat, for gasoline vehicles, won by L. P. Mooers (Peerless); L. E. Holden (Orient), second; Jacques Louvegnez (De Dion), third. Time, 1m. 39 1-5s. Won by ⅛ mile. Louvegnez beaten by Holden a third of a mile.

Final heat won by L. P. Mooers (Peerless); Thomas Holden, Jr. (locomobile), second. Time, 1m. 38s. Won by ¼ mile.

One Mile Against Time.—George C. Cannon (Cannon). Time, 1m. 8 3-5s. World's steam track record. Previous record, 1m. 39s., by T. E. Griffin (locomobile), Chicago, September 18, 1900.

One Mile Against Time.—J. W. Howard (Howard). Time, 1m. 9 3-5s.

Steam Vehicles (distance 5 miles).—Track record, 8m. 26 2-5s., by George C. Cannon (Cannon), Boston, June 8, 1902; 1 mile, 1m. 39s., by T. E. Griffin (locomobile), Chicago, September 18, 1900. Won by J. W. Howard (Howard); Thos. Holden, Jr. (locomobile), second. Time, 9m. 5s. Won by a mile.

Gasoline Vehicles, under 1,000 pounds (distance 5 miles).—Track record, 11m. 43 3-5s., C. J. Field (De Dion), Guttenburg, September 18, 1900; 1 mile, 1m. 44⅘s., H. C. Dailey (Duryea), Reading, Pa., June 6, 1902. Won by Jacques Longuevez (De Dion); L. E. Holden (Orient), second. Time, 2m. 1 3-5s., 3m. 37 3-5s., 5m. 14s., 6m. 51 3-5s., 8m. 30 2-5s. New records for fourth and fifth miles.

Gasoline Vehicles, between 1,000 and 2,000 pounds (distance 5 miles).—Track record, 8m. 51s., Percy Owen (Winton), Providence, October 18, 1901. One mile, 1 m. 51¾s., Percy Owen (Winton), Providence, R. I., October 18, 1901. Won by F. A. La Roche (35 h. p. Darracq); Percy Owen (15 h. p. Winton), second. Time, 1m. 24s., 2m. 42s., 3m. 59 3-5s., 5m. 20 2-5s. and 6m. 42s., all new track records in this class. Won by ½ mile.

Free For All.—Distance, 10 miles; track record, 11m. 9s.; Alexander Winton (Winton), Detroit, October 24, 1901. Won by H. S. Harkness (Mercedes-Simplex); F. A. La Roche (Darracq), second; L. P. Mooers (Peerless), third; Jacques Louvegnez (De Dion), fourth. J. W. Howard (Howard) stopped at 2 miles. Time, 11m. 54 4-5s. Won by 1½ miles; third, half lap behind second. Placed man's time, second, 13m. 11 4-5s.; third, 15m. 17s.

Unlimited Pursuit Race.—Won by H. S. Harkness (Mercedes); J. W. Howard (Howard), second; F. A. La Roche (Darracq), third. La Roche caught at 4¾ miles in 6m. 18s., and Howard at 5⅜ miles in 7m. 13s.

Obstacle Race.—Won by W. F. Murphy (locomobile). Time, 1m. 51 1-5s.

One Mile Trial Against Time.—George C. Cannon and T. L. Marsalis (Cannon). Time, 1m. 7 3-5s. Quarter, 15 2-5s.; half, 33 2-5s.; three-quarters, 50s. World's track records for steam vehicles.

The Dashwood hill climbing trials in England, organized for August 8, had to be abandoned, as the police would not allow speeds over 12 miles an hour.

The publication of the A. C. G. B. and I. has changed its title from *Automobile Club Notes and Notices* to *Automobile Club Journal*, and is now provided with a colored cover of heavy paper.

According to a chart of mineral products just issued by the United States Geological Survey the output of aluminum in the United States was 7,150,000 pounds in 1901, as compared with 259,885 pounds in 1891.

The kilometre flying start record was lowered on August 22 to 29 1-5 seconds by Charles Jarrott at Welbeck, England. This time is one-fifth of a second better than the previous record, that of W. K. Vanderbilt.

The police administration of the Rhine country is taking measures to resist the invasion of Belgian automobiles. Parties from across the frontier race recklessly through German villages and a number of fatal accidents have recently been reported.

LESSONS OF THE ∴ ROAD ∴

Our Celebration.

By Charles E. Duryea.

(Concluded.)

The Return Journey.

This road for a number of miles is red clay, recently worked by a scraper and in good condition, excepting frequent gutters that prevent high speeds and necessitate careful watching of the road. Two stops were made on account of horses and one of twelve minutes to take out some more pinion teeth. At Heidelsburg, 19 miles, we inquired about the road and were assured that it was good, but found it quite bad. Here we saw geese with yokes on their necks, evidently to keep them from getting through the garden fence. We stopped again for a broken tooth and also for a scary team. We had just passed one horse with difficulty, because of its nervousness, and when we stopped for the next one the drivers of the first unappreciatively undertook to drive by us, a thing we did not permit, for we felt that it would be imposing on good nature to ask us to pass them again with great care when we had stopped to oblige a horseman. Horse drivers frequently complain that automobilists are not careful, but much room for improvement in treatment on the other side exists.

We reached York Springs a little after 8 and inquired which of the two hotels we should choose. We were advised that they were much alike, so stopped at the first one and unloaded, passing in through a crowd of Saturday night loafers. We were ushered into a dingy parlor, cool but musty, and waited while rooms with washing facilities were made ready. The vehicle was driven into the stable, following a guide in the dark on faith, up some steep rises and over some very rough thresholds. There was nothing to do but shut off the gasoline, so we were soon washed and ready to retire early. The day was exceedingly hot, and although pleasant riding, except for the burning effect of the sun, the close, sultry weather became very apparent in the valley when we quit going. Our beds were good, clean and comfortable, but quite hot.

The early morning awoke us with a patter of rain, the first of any consequence since we had started, although thunder showers had been visible all around us and two or three small sprinkles had been encountered. We therefore closed the shutters and slept late. After breakfast the vehicle was backed out of the barn into the open lot and the damaged tire inspected. Its wrappings were so badly worn that a change seemed advisable, so the old tire was removed and the new one put on with the assistance of the proprietor and other guests. So hot did the sun beat down that this work, although started in the sun, was soon moved into the shade of a nearby tree and completed in good shape. A little water was put into the tank, but gasoline seemed to be plentiful enough to carry us home, or at least to Lebanon, and at 9:40 we started.

This was the time when farmers were driving to church, so we met a number of horses and stopped three times on this account before reaching Dillsburg, nine miles. We were much surprised immediately after leaving York Springs to see ahead of us tracks of a rubber tired four wheeler, evidently lever steered, with about 2½ inch tires. We guessed this to be a steamer and soon decided that it was moving in the same direction as ourselves. We noticed with particular interest the fact that the driver, with good automobile sense, avoided the ruts made by the wagon wheels, for this is our practice, since it is very unpleasant and almost impossible to steer if one's wheels are in deep ruts. We could see that we were gaining, because the tracks were less obscured by the horse vehicles met, and at Clear Springs we passed him standing talking with a resident. The road was better than before we reached York Springs, and on the whole not bad.

At Dillsburg we left the Harrisburg road and turned northward toward Mechanicsburg, 8 miles, instead of keeping onward toward Shepardstown. We were advised to do this because the road was said to be in better condition, but afterward found that the very levelness of the road rendered it bad because of the mud left by the recent rains. While in Dillsburg we met a horse with two ladies driving, which proceeded to scare, causing us to stop. We suggested that the ladies drive around the block, but they very curtly informed us that they were not going that way, so we led their horse past, but did not even receive thanks. There are some people in the world who do not know when they are well treated.

North of Dillsburg the road is quite crooked and has some very short, rough spots, but all these we passed without difficulty. We reached Mechanicsburg shortly after 11, stopped to inquire the way and get a drink of water. The road is along a trolley line and was found to be level and rough almost all the way, ten miles. A stop for a horse and a twelve minute stop to take out some more broken pinion teeth brought us to White Hill at 12 o'clock. Here a short steep rise was climbed and another tooth heard to break, so another stop of two minutes was made to fix this, while almost immediately after a second stop of three minutes for the same purpose was made. The bridge at Harrisburg cost 17 cents toll and at 12:30 we were unloading in front of a restaurant for dinner. We had telegraphed from Gettysburg for a further supply of pinions and when we reached Harrisburg had but one left, so rather than take any further chances of a breakdown the operator started to the express office, two blocks away, on foot. It was found locked, of course, but the residence of the agent was ascertained, and four more blocks up hill in the hot sun were walked to find him and persuade him to open the office and get the coveted package. This he kindly did and our worries about getting home were much lessened. On opening the package we found the pinions were of steel, and we rested easy on the balance gear matter while we ate dinner.

After dinner the wagon was driven to the nearest livery stable, a fact afterward regretted, for flies were thick and bloodthirsty, and aggravated the work of putting in the pinions considerably. Further, the pinions seemed to be a little over size, and had to be filed to make them shorter so as to get them in place. To further aggravate matters, dark clouds came up and a heavy rain storm drenched the city, making it harder to work in the dark under the wagon, and preventing us from starting when the job was finished.

We were delayed at Harrisburg until 5 o'clock; then deciding that the rain was practically over we started in a slight sprinkle that continued for 5 or 6 miles. In Harrisburg we had seen a steam auto ahead of us as we entered the city, and met the same vehicle 6 or 8 miles out returning to the city. Evidently they had been storm bound like ourselves. One stop for a horse was made before we reached Hummelstown, a little before 6. We soon were at the first toll gate, 12 or 15 miles from Harrisburg, where we paid toll at the rate of a cent per mile. Shortly after this we met two horses being driven in a most careless manner with several feet of slack line, and having nothing to restrain them they swerved off to one side and ran into the fence. No damage was done, however, and we continued.

As we approached Palmyra and Lebanon the evidences of rain were far more pronounced, the roads being very wet and muddy, with water in some places completely covering them. The knock of Friday had not given us much trouble on Saturday or Sunday, and practically no attention had been paid to it, but the higher speed and harder pulling on the pike in the mud evidently was aggravating this trouble, so we stopped five minutes to see what could be done with it. As before, nothing was visible, so we started again, only to be obliged to stop by the knock growing worse. Here the motor was examined a little more carefully and one oil cup found to be empty, evidently because it had been adjusted too freely at the beginning in our efforts to stop the objectionable noise. The other two oil cups were nearly half full, however, showing that this one was feeding at a very rapid rate. We, therefore,

opened our reserve can of oil and filled up, which allayed this trouble again.

We reached Lebanon about half past 7, but as it was late and the road exceedingly bad we pushed on, trying to get as near home as possible before dark. The storm had ceased, but the wind had changed, bringing back a dense fog that looked like rain at a distance, so much so we decided to pull in at the first convenient barn to wait for the storm to go over. Fortunately, however, no barn was met, so we continued, only to find that that the apparent rain was fog, and so thick a fog that driving after dark became a very tedious matter. The water on the road seemed to be reaching our magneto pulley and interfering with the driving of the magneto. Several times the engine missed fire, apparently from this cause, and finally stopped. We found the flywheel dry, however, so started again, only to be stopped again soon, and when this happened a third time we investigated fully, and found the magneto shaft needed oil, the oil cups having been filled with a heavy grease that would not run. An application of the oil can remedied this trouble in short order, and we were again on our way. At the next toll gate a well was handy, so we got a drink and filled the water tank.

After passing Owl Creek, 6 or 8 miles east of Lebanon, the roads became less muddy, and by putting our single lamp in front of the dash, where it could not be seen by the driver, we were able to make out the road fairly well, and continued at a good pace toward Reading, the lights of which could be seen on the clouds ahead of us. We had no balance gear troubles, no more knocks in the piston after the oil cup had been filled, and nothing to do except watch for horses looming up in the dark and stops for toll gates.

Our hopes of arriving soon at home were brought to a standstill by the motor stopping near the top of a steep hill about 2 miles from Sinking Spring. Cranking did not produce a result, and the lantern was turned into the machinery for inspection, but nothing could be seen. The bottom of the mixer was unscrewed, thinking that it was probably filled with water, but nothing flowed out, showing that the fuel tank was empty or the passage to the mixer stopped, and inspection proved the former. Although by the side of a trolley line we had not seen a trolley car, and did not know whether they were running as late as 10:30 on Sunday night or not. While we were discussing the matter one appeared behind us, which we at once hailed and inquired whether gasoline could be had at Sinking Spring. The conductor was well informed on this important point, and assured us that it could be, so the operator went with the car, leaving the family in the middle of the road wondering when he would return. At the village the gasoline man had just retired, living over his store, and it took some time to get him roused, dressed and advised as to what was wanted. He quickly secured his supply, about 4 gallons, as a car going in the right direction came in sight. He grasped the idea that this was the car to catch and rushed out hailing same. Promising to return the can and pay him on the morrow we were soon back with the vehicle, losing about half an hour by the operation. There were no more horses met, and no occasion to stop, for the toll houses were closed, so we reached home without further incident at 11:25, having covered by cyclometer 207 miles in three days.

We made all told about eighty stops, five of these being for the knock in the motor that we were attempting to run out, eight of them for the trouble due to the use of brass pinions in the balance gear instead of steel, two to the rim cut second hand tire, one to take water when we did not need it, one stop for tightening chain screw nut, one for oiling magneto and two to find if it needed it. The remainder were stops made necessary or advisable by the horses, toll gates or other requirements of the trip. This number of stops in this distance is certainly an argument against the value of non-stop runs, and it would seem that all the purposes desired could be accomplished by keeping record of the stops as was done in this instance instead of attempting to make such impractical records as non-stop runs.

The ride was voted a decided success, and outside of the knock in the motor and the balance gear pinions, both of which were foreseen and would not have existed in a completed vehicle, there were but three troubles, the bursted tire being by far the worst one, as both the loose chain screw nut and the oilless magneto shaft required but an instant to make right.

We avoided high priced places and secured good accommodations by stopping over night at the smaller inns, where, although the surroundings were homelike, the food well prepared and the beds clean, the prices were but 25 cents per meal, as is largely customary throughout this portion. So slight therefore were the expenses of this trip for seven people going and five coming, viz., $18.12, that they are given because of their probable interest to many who would undertake similar tours if the expenses did not prohibit.

Although two exhaust valves were leaking when we started, one had become tight and the other nearly so by the time we returned, indicating that not only the bearings of the motor, but even the valves were in better condition at the finish than at the beginning. The high speed clutch was slightly loose at the beginning and quite loose at the finish, but not enough to prevent satisfactory driving. No adjustments of clutches, cleaning of insulations, setting of sparkers or work of any kind, except, as before mentioned, was done on the vehicle during the trip. It was put away at night without attention other than closing the gasoline needle and started in the morning without even lifting the cushions. When the size of the load, the condition of the roads and the newness of the vehicle are considered we feel that as an endurance run it was a success, while as a pleasure trip we are all most enthusiastic about it.

An interesting fact was the comfort and pleasure of the trip compared with much shorter trips by horse vehicles, as evidenced by the writer's mother, more than sixty years of age, thoroughly enjoying every minute of the trip and feeling fresh enough on our arrival at Gettysburg to climb the observation towers without difficulty, whereas the writer can recollect how, more than thirty years ago, she would return exhausted from a single all day drive of 50 or 60 miles behind a good team of horses. The comfort of the motor vehicle largely accounts for this freedom from fatigue, while the pleasant country through which we were driving, sufficiently mountainous to present an ever varied scenery, and yet so well kept that each valley is a garden spot covered with beautiful fields, well kept fences, large orchards, great stone barns and substantial dwellings, does much to prevent fatigue by constantly exciting one's attention and admiration. The roads are not so good as may be found in many portions, but all things considered it is a most pleasant region for touring. The distances are as follows: To Lancaster, 34 miles; to Columbia, 10; to York, 13; to Gettysburg, 28; around Gettysburg, 27; to York Springs, 13; to Harrisburg, 27; to Lebanon, 28; to Reading, 27.

Police Traps in Evanston, Ill.

On Sunday, August 17, seven automobilists were arrested for speed excesses by the police of Evanston, a suburb of Chicago. Each of the parties arrested gave a bond of $50 for his appearance for trial on Monday.

Those arrested and the times in which they made the measured off one-eighth mile, according to the police, are as follows: B. F. Harris, 28 seconds; J. H. Toole, 32 seconds; Charles Morgan, 39 seconds; H. P. Coleman, 28 seconds; B. C. Hamilton, 29 seconds; J. W. Seaver, 34 seconds, and W. B. Lane, 31 seconds.

The measured off stretch lay on Forest avenue in Evanston, a very smoothly paved thoroughfare. The legal speed limit is 8 miles an hour, which makes the minimum time for one-eighth of a mile about 56 seconds.

W. B. Lane protested against his arrest on the ground that the police had made a mistake in catching the time. According to his statement, he had held a stop watch himself, and had kept within the limit. He offered to go over the course again at the same rate of speed to prove his point, but the police would not listen to the proposal.

Each of the offenders was fined $5 the next day.

BEGINNERS PAGE.

Generalities About Steam and the Steam Carriage.

Steam, as everyone knows, is the gaseous product of the ebullition of water, and has been used as a medium for mechanical power generation for over a century. It is an invisible, expansible gaseous fluid generated from the water in an apparatus called a steam boiler, and made to give up its potential energy (most of it at least) in a device called a steam engine.

The usual method of steam generation is to apply heat to a metallic surface, which on the other side is in contact with water. Heat is thus imparted to the water by transmission through the metal wall, and when the water attains a certain temperature it begins to boil and give off steam. If the vessel containing the water is open to the atmosphere the temperature of the water will never exceed 212° Fahr, however fierce a fire may be built under the vessel. But if the vessel be closed the results are different. The formation of steam begins when the water or part of it has attained a temperature of 212° Fahr., but as steam accumulates in the upper part of the closed vessel the pressure upon the surface of the water rises above atmospheric, and the temperature of ebullition—that is, the temperature of the water—rises in proportion. Thus while at atmospheric pressure the temperature of ebullition is 212° Fahr, at a pressure above atmospheric of 50 pounds to the square inch the temperature is 297° Fahr.; at 100 pounds per square inch pressure it is 337° Fahr.; at 150 pounds per square inch, 365°; at 200 pounds, 387°, and so on. The temperature of the steam is, of course, the same as that of the water from which it is formed. Hence, if heat is imparted to water in a closed vessel the pressure of the steam generated will rise, and with it the temperature of the steam, in a certain definite relation, which has been fully investigated by physicists, and the results of their experiments in this direction are embodied in so called "steam tables," which are principally used by engineers in making boiler and engine tests. If now the water in the vessel should have all been transformed into steam and still more heat be added, or if the steam be led from the vessel in which it is generated to some other vessel, by a connecting pipe, and there more heat be added to it, the temperature of the steam will rise without any increase in pressure. These facts it is well to bear in mind—that when heat is added to a vessel containing both steam and water in direct contact with each other both the pressure and temperature of the steam rise, whereas when heat is added to a vessel containing steam only the temperature of the steam rises without a rise in its pressure.

Engineers speak of three kinds of steam—saturated steam, wet steam and superheated steam. Saturated steam is steam of a temperature equal to the temperature of ebullition corresponding to its pressure and holding no particles of moisture in suspension. It is invisible. Wet steam is steam containing particles of moisture. Superheated steam is steam having a higher temperature than the temperature of ebullition corresponding to its pressure. Superheated steam can, of course, not hold any moisture in suspension. Generally speaking, superheated steam is the most efficient medium for the conversion of heat energy into mechanical energy; saturated steam comes next and wet steam is the least efficient. Saturated and superheated steam are collectively referred to as dry steam.

Some physical and quantitative details regarding the process of steam raising may be of interest to the beginner. These explanations will require the use of the term "British thermal unit," which we will therefore define at the outstart; also the term specific heat. A British thermal unit is the amount of heat required to raise the temperature of 1 pound of water 1° Fahr. at 39° Fahr. While in the specification of this unit a temperature of 39° Fahr. is mentioned, it takes practically the same amount of heat to raise a pound of water 1 degree from any other initial temperature, from the freezing to the boiling point. Other substances, however, as well as ice and steam, water in the solid and gaseous state respectively, take a vastly different amount of heat to raise 1 pound of them 1 degree in temperature. The ratio of the heat required to raise a certain quantity of any substance 1 degree in temperature to the quantity of heat required to raise the same amount of pure water 1 degree in temperature is called the specific heat of that substance. The specific heat of saturated steam is .37 (i. e., the specific heat at constant volume). Thus to raise the temperature of 1 pound of steam 1 degree without increasing the volume requires the expenditure of .37 British thermal units.

The density of steam is only about five-eighths that of air at the same pressure and temperature. That steam is lighter than air is also apparent from the familiar phenomenon of steam (containing moisture) rising in the atmosphere. The evaporation of water at atmospheric pressure and normal temperature expands it about 1,650 times. That is to say, a cubic foot of water evaporated gives about 1,650 cubic feet of saturated steam at atmospheric pressure. However, at a pressure of 100 pounds per square inch above atmospheric the steam only occupies 238 times the space of the water from which it was generated, and at 200 pounds per square inch above atmospheric 132 times.

In the process of steam generation heat must first be supplied to the water tc it to the temperature of ebullition. water fed to the boiler is usuall sumed to be at 60° Fahr. To the water to 212°, the boiling requires therefore 142 British mal units per pound. Then the must be vaporized, which requires t penditure of 894 thermal units, whi steam absorbs as latent heat, and 72 thermal units to overcome the ance of atmospheric pressure to tl pansion of the steam. If now we saturated steam at 200 pounds abo mospheric pressure it must still be from 212° Fahr. to 387° Fahr since the specific heat of stea constant volume is .37 it re $(387-212)\times .37=65$ British tl units per pound more to obtain steam pressure. Consequently to ge saturated steam of 200 pounds abo mospheric pressure per square inch water at 60° Fahr. requires $894+72+65=1{,}173$ British tl units. If the steam is to be super at this pressure it requires the ex ture of about .34 British therma per pound and per degree of heat.

A knowledge of these figures course, not at all necessary to the su ful operation of a steam carriage.

THE PARTS OF A STEAM CARRIAG

The steam is generated in a boile its potential energy is converted int chanical energy in a steam engine fro crank shaft of which the power is mitted to the rear axle or wheels, by chains. Steam is produced i boiler by means of a liquid fuel under it, the fuel being sometimes sene, but most frequently gasoline. fuel is stored in a tank, and means be provided to feed the fuel to the b and to regulate the feed in proport the steam consumption, which in tu pends upon the power required to the vehicle. These means usually prise a plunger pump for pumping air or the liquid fuel, and a valve op by the pressure within the boiler tc odically discontinue the fuel feed. other attachments or minor parts steam carriage mechanism are the f ing: One or more pumps for pu water into or "feeding" the boiler; pass valve for controlling the feed boiler; a steam gauge for indicati boiler pressure; a water gauge for i ing the water level in the boiler; a valve to prevent the steam pressure boiler rising above a certain predete point; a muffler to deaden the noise haust from the engine; a feed water to heat the water by the exhaust ste furnace gases before it enters the and a condenser to condense the e steam and pass it back into the Not every steam carriage has or ne of these devices.

...COMMUNICATIONS..

Educating the Governor.

KANSAS CITY, Mo., August 18.

Editor HORSELESS AGE:

The writer took Gov. A. M. Dockery, Congressman Cowherd and Police Commissioner W. T. Kemper to a political meeting nearly 32 miles east of here on Saturday last, making the time going out in 2 hours and 25 minutes and returning in 2 hours and 10 minutes. It was the Governor's first experience in an automobile, and he was frightened nearly to death to start with, but on being deposited safely at his hotel on his return he was very enthusiastic in praise of the machine, a four passenger Haynes-Apperson, which has been run for two years.

The Governor stated that he had been very much opposed to automobiles, believing that they were a menace to country people, horses, etc., and that their speed should be restricted, and when the writer suggested to him that there was a State law prohibiting over 15 miles an hour he expressed himself decidedly to the effect that this should be repealed, and I am conceited enough to imagine the trip will result in great benefit to automobilists in this vicinity. We have here the finest macadam roads in the world, extending 40 and 50 miles into the country, and 14 miles of the trip from Lone Jack to Lee's Summit was made in exactly thirty minutes, Congressman Cowherd taking the time.

D. F. PIAZZEK.

The Item of Cost—Skidding.

SALEM, Mass., August 19.

Editor HORSELESS AGE:

In the issue of August 13 W. D. Hurlburt's account of the cost of running an automobile is interesting, because it shows that he is an expert mechanic and a careful operator. However, I sincerely hope that no prospective purchaser of an automobile will be led astray by Mr. Hurlburt's figures. Unless the owner is a practical machinist, with access to a machine shop outfit, I have an idea that the expense of keeping an automobile would amount to considerably more than the sum stated by Mr. Hurlburt. And perhaps he had good luck, which counts for much.

I have had automobiles three years, and my experience has not been on a par with Mr. Hurlburt's so far as cost is concerned. I have what are considered first class machines, and I am now able to locate the troubles quickly, thus economizing on the time formerly required to make repairs, when machinists took two days to find out what was necessary to be done.

I keep one machine running nearly every day, going from 20 to 75 miles, perhaps averaging 40 miles a day at a speed of, say, 15 miles an hour. My carriages are not racers and have low power compared to the weight they carry, so that excessive speed is impossible. And yet I find that it requires about all of one man's time to keep the machines in order, to say nothing of the parts I must buy. I have a week at a time occasionally when nothing but cleaning is required, and then will come a succession of days when every trip means something to be done at night. As a sample I will mention my experiences of a week recently. Starting Thursday afternoon I put in about 50 miles, coming home with a punctured rear tire, and it was so badly rim cut that a new tire was necessary, at a cost of $37.50, including putting on and express charges. Saturday afternoon I started out, and before going 200 feet the gasoline needle valve was broken. That delayed an hour while a new one was made, costing $1. Sunday I went about 35 miles and came back with a front tire punctured. Another new tire at $37.50 was secured for Monday. That afternoon I got along with breaking a spring. A new spring meant $3.50, but there was no cost for putting it on the machine. The spring lasted for Tuesday's work, when that was broken. Another $3.50 went for a second spring. Wednesday the headlight fell off and was smashed, so a new one at a cost of $25 became necessary. Thursday the gasoline tank started leaking. It was taken out and fixed at an expense of $3. Friday I went quite a long distance, and on the return found that part of the differential gear was broken. It cost $12.50 to make repairs, including new parts. Saturday the bolts holding the main bearing of the engine shaft worked out. New ones had to be made, and this amounted to $1.75. Here's a record of eight days' constant use of a well made gasoline carriage that did not get smashed in an accident and was not run at express speed, while the roads around here are in excellent condition. Of course, I do not have to get new tires every week, but they are liable to give out any minute, so that expense must be considered by people who are thinking of buying a machine. Ordinarily I find that good tires will last a full year. By that time the rubber is usually worn off.

I keep many spare parts and tires, so that the repairs I have listed did not cause any delay in using the carriage, and I did not stop on the road to fix things, for the machinery could run without difficulty in spite of the troubles. To show the reliability of the particular carriage I am referring to, I will say that during "Old Home Week" here I had the machine out every day for five days, generally starting at about 9 in the morning and stopping anywhere between 10 o'clock and midnight. Some days I went 150 miles, while taking out visitors. One party included the Secretary of the Navy, William H. Moody. He doesn't care much for automobiles, and so was rather nervous, but the machine ran nicely. I also took out many officers of the ship Hartford, and had no trouble on the road, even when carrying five and six people. I hate to mention the matter, but the original intention was to carry some of the distinguished visitors in a steam carriage, yet I was pressed into service, because the owner of the steamer could not get it into running condition. This may or may not be a straw. Anyhow, my machine was always ready to run in the morning, although I admit that some work was usually required at night to keep it in shape.

With another carriage of the same make, but smaller, I have had to buy four new tires this summer, in addition to putting in new gears and new axles. The tires cost $110, and the machinists' bill was $65, while the gears amounted to $35.

I do not think my experience has been any more costly than that of other people, if they use large carriages constantly. I find no particular part gives out from weakness, for the general design seems good. The troubles come simply from the fact that steel, iron and brass will wear when used a good deal, and naturally they must be renewed. And rubber tires! When they get up to 4x32 and 4x36 inches they wear about as quickly as the smaller sizes, while the cost makes the expense of keeping up a vehicle heavy.

Another point that is not given due consideration is the danger of running when the roads are wet. I have already had an automobile tipped over and landed upon my back under it, and three times recently my machines have nearly turned around in the streets when the pavements were muddy. The first time was when I was returning from the repair shop with the machine that capsized. The other times were with a long and heavy surrey. If the machine is kept going straight ahead I find no trouble on the muddy roads, but it often happens that it is necessary to turn some, and then the rear of the carriage wobbles. I have read that application of the brakes only increased the difficulty, but the last three times I found the carriages inclined to go all over the street I put on the brake hard, and it stopped the machine without causing damage. It is likely that sudden application of the brakes might cause an automobile to skid on a muddy road, yet when it is skidding into a tree or curbstone I think the wisest plan is to try and stop the wheels from turning.

I often meet light carriages running at pretty high speeds on roads covered with mud, apparently without thought of danger. Recently I saw a steamer turn completely around, much to the surprise of the operator. He got out and carefully examined the wheels and steering gear, in a search for the cause of the machine's strange behavior. I noticed that when he

started on again he pulled the throttle open and hit up a sharp clip.

Apparently the skidding habit is not confined to vehicles with short wheel bases, for my surrey is over 10 feet long, and yet it is inclined to get frisky when the car wheels get coated with mud.

In the face of the cost and the liability of accidents, automobiling is so filled with pleasure when the engine does run that even in this conservative section the machines are constantly increasing in number.
ROBIN DAMON.

Chains and Graphite.

JERSEY CITY, N. J., August 21.

Editor HORSELESS AGE:

In your issue of August 20, page 185, you have an article entitled "The Care of Chains." It is because the article is taken from a foreign contemporary that we note with surprise that the writer is not in favor of what he is pleased to term "blacklead."

It is only within the last month that we have received an earnest request from our London branch to make up an automobile chain lubricant, the same to consist of a hard cake in which there shall be a good percentage of Dixon's lubricating graphite.

The demand from the foreign automobilists was at first for a pan containing a hard graphite lubricant, the idea being to put the pan on a stove and when the lubricant had melted sufficiently to immerse the chain, which had previously been cleaned. After the lubricant in its heated condition had thoroughly penetrated all of the bearing points the chain was to be removed, wiped comparatively dry, the pan removed from the stove, and on cooling the lubricant would harden to its original condition.

On looking around for information relative to the proper size for such a pan, we found that chains vary so greatly that we would be obliged to have pans from 12 inches in diameter to others of some 2 feet, and that precluded the idea of sending the lubricant out in pan form.

We have now made a shipment of the lubricant in pails, but the lubricant is not quite so hard as it is desired to have it, but the idea now is that the owner of the automobile shall obtain a pan of the required size, put as much of the lubricant in it as he desires, melt it and then follow the methods outlined in your article, which we refer to above.

The idea will come to many—why not have a soft lubricant; why one that is so very hard? The reason for a hard lubricant is that as it cools on the bearings of the chain it makes a better bushing than anything soft could possibly make; also one not liable to so readily retain dust and dirt.

We therefore hereafter shall probably put up the lubricant in a cake which will melt at about 180° Fahr.

As to the addition of the graphite, there is absolutely no question as to the advantages which come from the use of graphite in all lubricants.

As we are writing now practically to a foreign contemporary, it may not be out of place to quote the following for his benefit, and for the benefit of all others who may have some faint doubt in their minds relative to the value of graphite as a lubricant.

"I have high speed (Willans) triple expansion (three crank, nine cylinders) engines of 800 horse power at work, using one drop of the Dixon graphite mixture per minute; engines of 575 horse power using less than one drop per minute, and similar engines (two crank, six cylinders) of 50 horse power, using one-third of a drop per minute, all with most satisfactory results. The lubricators require filling once in two months. The above have been in use for eighteen months.—H. W. Miller, M. I. C. E., chief engineer, K. & K. E. L. Co., and K. & N. H. E. L. Co."

JOSEPH DIXON CRUCIBLE COMPANY.

The Passing of the Horse.

Editor HORSELESS AGE:

Being very much interested in the future success of automobiles it appears to me that your paper is on the right path by publishing the experience and views of those who can speak from practical experience.

There is one important question which has been before the readers of your paper but which so far no one has answered—namely, what are the objections to the solid or cushion tire?

According to my experience with the single tube pneumatic there is much to condemn it for any practical use, for you never know when starting out how far you can go and be able to return, while the expense is beyond reason. So far this season it has cost me 10 cents a mile for tires alone, to say nothing about other unpleasant experiences with them besides expense. If this is a fair sample of pneumatic tires, and their only redeemable feature is their speed, then I can recommend them only for racing purposes for those who like to indulge in that sport.

My first idea, when the automobile fever was at its height, was that nothing would answer my purpose unless it would go 25 miles an hour and over. This impression I got by reading fabulous stories in catalogues and in automobile papers, instead of using my better judgment.

The faster you run a machine the greater the strain on its parts, and where there is a great strain it is not simply a possibility, but a probability, that you will meet with accidents, and that must be averted to make automobiles popular. In going out for a run with your familly it is not a question of time, but to be able to return again and carry out your promises. Ten miles an hour is good time, while the average roads are only suitable for 6 to 8 miles for comfort. For those
speed it will be a happy day wl
automobile roads will be buil
horse with his sledge hammer
excluded from the road; for so
terial has been found which is
very hard on the horse's hoofs
idly destroyed by their blows.
ple realize the destructive eff
horse's hoofs on the pavement.

Besides, the horse is largely
for the dust nuisance. With f
reducing the road material to
other impurities from the horse
be carried into the houses by
will not hail the day with plea
the automobile will control the
every street be a perfect stre
wear or tear?

The Endurance Cont

Editor HORSELESS AGE:

The object of an enduranc
should be to show the intending
just what may be expected from
cle when he gets it, for this is
wishes to know and he does n
learn anything else. It is there
festly needless to try to teach
thing else. An endurance contest
clude a complete record of
done by or to a vehicle from st
ish, and from this complete rec
various vehicles the public may
fair and accurate opinion as to
parative merits of the vehicles
conditions met on the roads trav
in the time. To secure this r
observer should accompany th
whenever the operator or any
ested in the vehicle is with it,
the observer is not present th
should be locked up in the con
from the possibility of anyone
unreported work on it. It is
factory that an hour or two be g
morning before starting unless
that transpires during this hour
reported. There should be no
tion for putting in new motors n
new spark plugs, except in degr
degree should be based upon th
tionate cost in time and mone
change; but whether the new mo
new spark plug is fitted en rout
should be recorded so that tl
may know it. A non-stop is
one, of course, but there are
road many occasions for stops
manded by the vehicle and this
should be freely allowed, and il
they destroy the non-stop charac
run. The stop for gear changi
you mention, and which, as you
rectly, should not be penalized,
fault of the vehicle, but a fault o
tem employed in the constructio
vehicle, and although not pen
should be mentioned, for no purc
give preference to a vehicle that
to change its gears when, oth

being equal, he can secure one that does not have this objection, and it is safe to assume that the vehicle which cannot be changed without stopping by a skilled operator would give more trouble to an unskilled one. The rules should be so drawn that no operator is obliged to take foolhardy risks or in any way endanger public safety for the mere sake of avoiding stops. As to stops for the vehicle, the penalization should be based upon the length of stop and the cost of the work or of the replaced part required by the stop. Prices on parts are readily accessible and prices per hour of skilled mechanics are likewise, so that the money losses of each stop can be determined with a reasonable degree of exactness. I would suggest, therefore, a penalization based upon costs and calculated upon the total penalization possible. Something for example as follows:

Suppose the entire trip occupies 2,000 minutes. It is a poor vehicle that will not run half the time. Make, therefore, the scale 1,000, and for each two minutes lost deduct one point and for each part replaced deduct as many points as the cost of the part represents in two minute periods of time of a skilled repairman. Such an arrangement would make the contest a non-cost run rather than a non-stop run, and since it is cost in time and money that the public is most concerned with, this should be a most satisfactory run. The fuel cost is another item worthy of consideration, and it either should be kept separate from the maintenance cost or else a proper relation between the two should be decided upon in advance. It is quite evident that a heavy multiple cylinder vehicle may be more comfortable than a light single cylinder one, and this fact would undoubtedly influence a purchaser to favor the comfortable rig rather than the other, in spite of its increased fuel cost. The average automobilist does not go riding to save gasoline, and the fuel economy feature may therefore be given little consideration for some time yet to come.

The gist of my disconnected argument is that non-stops, like high speed, should be eliminated, and that reliability, "no cost," is the thing desired. To properly cover this point the condition of the vehicle, after arrival at the end of the journey, should likewise come in for consideration, for this depreciation is certainly a part of the cost of the run.

CHARLES E. DURYEA.

The Crystal Palace Show.

LONDON, August 16.

Editor HORSELESS AGE:

I have much pleasure in sending you herewith some particulars of the exhibition of motors, motor cars and accessories we will hold from January 30 to February 7, 1903. From the firms whose names you will note on the accompanying list you will see that we have received the support of practically all the leading firms in England. Not only have we got this, but the following twelve firms have signed a bond not to show at any other show than ours in 1903, viz.: Messrs. The British Electromobile Company, City and Suburban Electric Carriage Company, Daimler Motor Company, De Dion-Bouton, Farman Automobile Agency, Humber & Co., Locomobile Company of America, G. F. Milnes & Co., Motor Power Company, Panhard & Levassor, Sims Manufacturing Company, Thornycroft Steam Wagon Company. Any breach of this undertaking will entail a penalty of £250. The establishing of this bond was largely brought about by the multiplicity of shows with which we are threatened in England, and the prevention of this was to a great extent the cause of the formation of the Society of Motor Manufacturers and Traders. This society has received very influential support and after very careful consideration of the advantages offered by various shows to be held next year decided to support the Crystal Palace one for the following reasons: It will be held in the most suitable building, one built entirely of glass and iron, with a floor space available for show purposes of over 70,000 square feet, and is surrounded by 200 acres of park-like grounds in which practical demonstrations of the various types of cars can be given, and also because the Crystal Palace Company were prepared to hand over the management to a committee to be formed by representatives of the society and of themselves, and were also prepared to give them a practical interest in the result of the exhibition by allowing them 33⅓ per cent. of the profits. Taking this in conjunction with the extremely low normal charge for space, viz., one shilling per square foot, undoubtedly the cost to those exhibitors who are members of the society will be reduced to a minimum. I trust you will take an early opportunity of bringing the advantages of our show before your readers, as the space is filling up very fast, and as, of course, your advertisers would naturally like to show at the leading English motor show of 1903, I shall be very sorry if their applications for space should arrive so late that I should not be able to find them room.

FREDERIC W. BAILY.

Cost of Operation.

Editor HORSELESS AGE:

The article in your issue of July 23 by Harry B. Haines with reference to cost of maintaining a light gasoline runabout would certainly discourage the prospective purchasers of such a machine. As a strong believer in the utility of this type of machine I assume its defense. Early in April I purchased a light gasoline runabout of a well known American make, and from the scant description Mr. Haines gives I believe the same make of machine that proved so expensive to him. I have now operated the machine for four months and have traveled something over 1,200 miles. My total expense account has been as follows:

1 barrel gasoline...........	$7.50
1 gallon cylinder oil........	.50
1 gallon machine oil.......	.75
1 pail grease..............	1.00
1 dust cap for front wheel..	.40
Repairing fenders..........	1.25
16 cells dry battery.........	3.20
Paid man washing vehicle..	4.00
Total	$18.60

This gives an average cost per month of $4.65. It will appear, also, that the average operating expense has been about 1½ cents per mile. Unless I have some unusual repair bills, not anticipated, the cost of my next 1,200 miles will be considerably less, as I have oil and grease enough left on hand for 1,000 miles or more and I find that by careful adjustment and cleaning of the contacts on my spark coil I can get considerably more work out of my batteries, and I expect to run my next 1,200 miles on one set of eight batteries instead of being obliged to use sixteen cells, as I did for my first 1,200 miles. With the exception of the small item of repairs on fenders mentioned the repair man has not touched my machine and I have found no difficulty in making, without help, the few slight repairs that have been necessary.

My machine has been used on bad country roads as well as on boulevards. On country roads I use it carefully, but not any more carefully than I would a horse drawn vehicle. In fact, I do not think that I give my machine any better care or attention than any user should expect to give a machine of this kind, nor any better than the average user would give a horse drawn vehicle. To sum it all up, my experience with the light American gasoline runabout weighing less than 1,000 pounds has been very satisfactory, and I believe the machine has been brought to a point where it is a thoroughly practical vehicle.

THOMAS I. STACEY.

[We do not see why the figures given by Mr. Haines should discourage anyone from purchasing such a machine, as they are lower than the cost of horse transportation. The difference in the figures furnished by Mr. Haines and Mr. Stacey is due to the fact that the former kept his machine at a storage station, at $12 per month, whereas Mr. Stacey does not make any allowance for storage, evidently keeping the machine in his own barn. Mr. Haines' figures also included depreciation. If storage charges and depreciation are left out in Mr. Haines' figures his cost per mile figures out to a little over 4 cents. That it is still considerably more than Mr. Stacey's figure is probably due to the fact that Mr. Haines used his machine rather roughly, as he himself admitted.—ED.]

The Insurance Question.

NEW YORK, August 22.

Editor HORSELESS AGE:

I noticed a communication from a gentleman in Boston, published in your last issue, about insurance on automobiles. I have been interested in this matter myself and I placed an order for a liability and a floater fire policy with my New York brokers some time ago and they reported that since January 1 more than three-fourths of the companies who began to issue these policies have withdrawn from the field, and that the rates on liability policies had been advanced from $50 to $100, and that the best rate he could secure for a floating policy was 5 per cent., and that there were very few companies willing to assume the risk even at this rate. It is true that I finally placed my policies through Dixie Hines, an insurance broker on Broadway, who had been recommended to me by several friends, and that he placed them at $50 each for the liability policies and 3½ per cent. for the floater policy, but a large number of my friends are now paying as high as 6 per cent. for floaters and $100 for liability, and even at these rates steam machines are declined.

Will you advise me why it is that steam machines are so universally refused by all brokers and companies, and why the rates are advancing so rapidly on the other lines? I had a long talk with Mr. Hines, who gave me the companies' side of the matter, but I want to know just what reason there is for it. I presume the risk is certainly worth 3½ per cent., when it is remembered that many of the buildings in this city are rated at 2½ per cent. to 3 per cent., and the floater covers these buildings as well as those in other parts of the city, State and country rated much higher, but I don't think they are worth 5 per cent. CHAS. E. WITT.

[The reason that so many companies have withdrawn from the automobile insurance field is undoubtedly that, as originally conducted by them, the business proved unprofitable. The present lack of competition in this line probably accounts for the seemingly abnormally high rates. We have no data at hand from which to draw conclusions as to what would constitute a fair rate for the different kinds of automobiles.

We would refer you to the editorial on this subject in this issue.—ED.]

A Reply to Mr. Krarup.

READING, Pa., August 21.

Editor HORSELESS AGE:

In your last issue I find myself describing a flying machine motor "developing 15 horse power per cylinder," which is an error. These cylinders are 4½x4½ and 5 horse power per cylinder was intended, making 15 horse total. The weight of this motor is interesting, being but 148 pounds, or less than 10 pounds per horse power. To this must be added, however, about 14 pounds for the magneto and spark coil.

Mr. Krarup seems hurt at my comments on his letter regarding skidding. I certainly regret this, for I have no wish to offend anyone who is helping to set before the public a correct knowledge of the motor vehicle and I most certainly do not wish to keep anyone from expressing themselves because of fear of my criticism, just or unjust, nor do I for a moment imagine that many care whether I agree with them or not. I quite well realize the futility of attempting to educate the world, but have hopes that my little experience might, like a single grain of sand, contribute to the general mass of knowledge that is rapidly, though somewhat crudely, being formed at present. Mr. Krarup says he merely wants to "agitate ideas and make people think." This is a very commendable purpose, but unfortunately most people will not think and are simply content to let others think for them, and this being true, there is no way to get at the facts connected with any subject except by an interchange of opinions, with discussions on disputed points, and none will welcome more gladly than myself a prompt reply from any who do not agree with me. If the subject is of importance to the automobiling public there will be a goodly number who will welcome such a discussion and who, by reading same, will think and decide for themselves.

Mr. Krarup suggests very kindly that I write on my own subject instead of on the ideas of others, forgetting apparently that the motor vehicle problem is my subject and that I have given (not sold) nearly a dozen of my best years to that subject. I realize, however, that the better part of the automobile business is still to come and the quicker it comes the better for me, so I am still doing what little I can to persuade the public to accept free of charge that experience which I have been accumulating in a slow and costly manner for so many years.

The question of lateral distribution of weight, which Mr. Krarup mentions, is one that would come under the head of lateral resistance and would tend to produce similar effects, but motor vehicle builders for the sake of their springs, if for nothing else, aim to distribute the weight evenly in a lateral direction, and this unequal distribution is very rare and therefore need not be considered as a general question. The "peculiar action of differential gears" ceases to be peculiar after the differential gear becomes thoroughly understood. If people would utilize the word "balance" instead of differential they would arrive at a clearer knowledge of this device more quickly, for it is simply an endless lever transmitting half the push to each wheel, regardless of the direction of motion of the wheel, less, of course, the friction involved by the relative motion of the parts and subject to the influence of the steering wheels. If either wheel strikes a slippery spot it will slip and revolve faster, while the other ceases driving, due to proportional loss of motion, but at all times the sum of the two motions is equal to that transmitted to the gear by the driving device and at all times the force applied to each wheel is equal.

CHARLES E. DURYEA.

New Automobile Company in Reading, Pa.

The Meteor Engineering Company has been incorporated at Reading, Pa.

The incorporators are Irvin D. Lengel, Edw. S. Youse and J. Milton Miller. The new company will manufacture steam automobiles in the plant at 753 and 755 Cherry street. The factory was recently purchased by Mr. Miller for $10,000 from Thos. K. Dalzell, trustee in bankruptcy for the Steam Vehicle Company of America. Operations will begin next week, it is said, with from fifty to seventy-five employees.

The new company will have a capital of $85,000—$50,000 of common and $35,000 of preferred stock. Only Reading capitalists are interested in the plant.

The Cleveland Races.

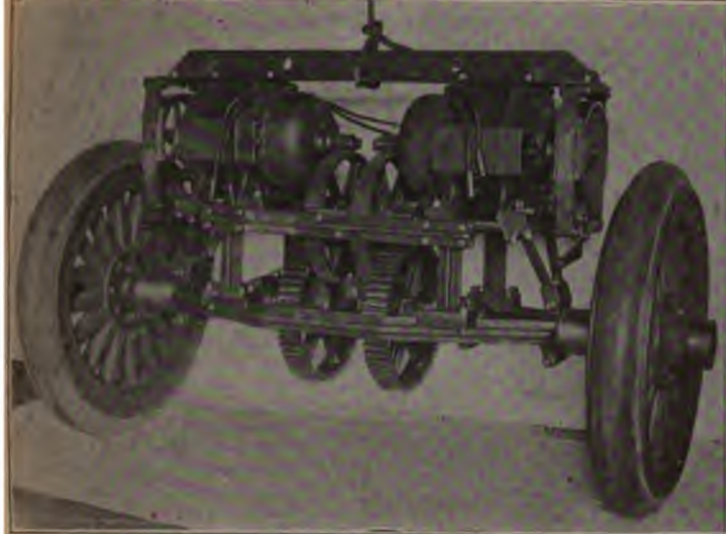
As already announced the Cleveland Automobile Club will hold a series of automobile track races on the Glenville Driving Park Track on September 16. Entry blanks are now out, and may be obtained from Geo. Collister, secretary of the club, 317 Superior street, Cleveland. The conditions are in brief as follows:

These races will be held with the sanction and under the racing rules of the American Automobile Association. The course is a regulation 1 mile track, 80 feet in width. The starting hour of the races will be 2 o'clock p. m. Vehicles are to be in racing trim. There is no restriction as to number of passengers or types. If the day of the races is a stormy one they will be postponed to the first pleasant day. The vehicles will make a flying start. The entrance fee for each race is $5.

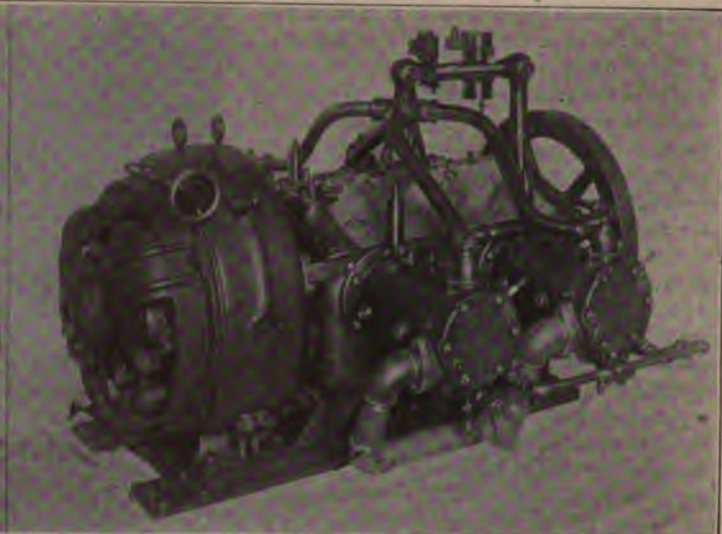
Contestants must be familiar with the racing rules of the American Automobile Association, a copy of which will be mailed each contestant upon receipt of entry.

The following events are on the program:

No. 1. Five mile steam race. All weights.
No. 2. Five miles. Gasoline vehicles, 1,000 pounds and under.
No. 3. Five miles. Gasoline vehicles, 2,000 pounds and under.
No. 4. Two miles. Electrics, all weights.
No. 5. Ten mile handicap for winners and seconds in events Nos. 1, 2 and 3.
No. 6. Twenty-five mile race. Open to all classes and weights.
No. 7. Australian pursuit race. Limit, twenty minutes.
No. 8. Ten mile handicap. Open to the field.



Top View of Motors and Driving Gear.



The Gasoline Engine and Electric Generator.

The Fischer Gasoline-Electric Truck.

The latest vehicle completed by the Fischer Motor Vehicle Company, of Hoboken, N. J., is a beer truck, which was built for Jacob Ruppert, the New York brewer. This, the company write, is to the best of their knowledge the largest truck ever built that was sold, delivered and went into daily service. This photograph, Fig. 1, was taken of the truck while making its regular trip. At the time it was loaded with eighty-three half barrels of beer or very nearly 9 tons.

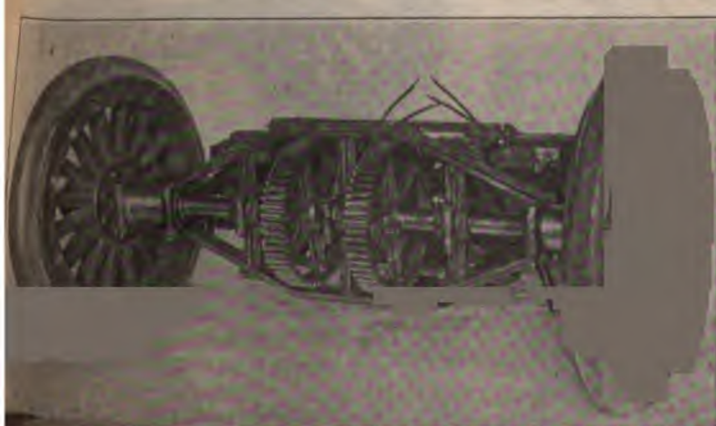
In general the dimensions of the truck are as follows: Total length, 18 feet 4½ inches; width inside stakes, 5 feet; width over hubs, 7 feet 6 inches; wheel base, 10 feet 6 inches; size of wheels, front, 36 inches; rear, 42 inches; equipped with 7 inch Calumet solid rubber tires. Both front and rear axles are trussed. Front springs are of the platform type; rear springs, half elliptic with free sliding ends. All strain due to driving is taken up by push rods from the spring saddles to the frame.

The power equipment consists of a four cylinder 5½x6 inch gasoline engine, coupled to a 9 kilowatt 110 volt dynamo running at 550 revolutions per minute approximately.

The Fischer Beer Truck.

The two motors are of 8 horse power each, and capable of standing an overload of 150 per cent. The battery consists of 44-136 ampere hour cells (three hour rate). The controller has five speeds each way. The maximum speed is 4½ to 5 miles per hour, with full load on level.

The manufacturers state that while the



Rear View of Driving Axle.

The Front Axle.

vehicle was being tested it hauled a 7½ ton load over a distance of 12 miles, one-third of which was up hill. At one place the grade reached 15 per cent. When the run was completed the gasoline tank was filled, thereby ascertaining how much fuel was used. It cost just three-quarters of a cent for fuel per ton mile to haul the load for the 12 miles.

S. M. Fischer, the president of the company, returned from London several weeks ago, where he is said to have succeeded in waking up the two largest omnibus companies to the possibilities of motor transportation. Both of them placed orders, it is claimed, for 'buses of the Fischer type. Several orders for heavy trucks were also booked by Mr. Fischer on his London trip. With the new addition to their present plant the factory space will be large enough to enable the company to handle the increase in its business.

THE HOFFMAN STEAM CARRIAGE.

The Hoffman Steam Carriage.

The accompanying illustration represents the Hoffman steam car, manufactured by the Hoffman Automobile and Manufacturing Company, Cleveland, Ohio, under the supervision of L. E. Hoffman, president of the Hoffman Bicycle Company and vice president and general manager of this company.

The most important feature of this car is said to be the flash steam generator especially constructed by Mr. Hoffman, and for which letters patent have been granted him. This generator is composed of a number of helical coils of pipe, one laid above the other, connected up in pairs. The water enters at one end and the superheated steam, containing no moisture, issues at the other. The generator is tested up to 1,200 pounds cold water pressure, and as there are no joints exposed to the fire it cannot be burned out nor can it be blown up, as there is only a small quantity of water in it at any one time. No steam pump, water glass, fusible plugs or safety valves are required.

The water circulates very rapidly, thus causing it, it is claimed, to produce about twice as much steam as the old type boiler of the same size, and the rapid circulation prevents scale or deposit in the tubes.

The engine is of the marine type, and especially constructed by Mr. Hoffman with the view of making it durable and strong enough for any emergency. It has a 3 inch bore and a 4 inch stroke, and with 150 pounds steam pressure is said to develop 6½ actual horse power; with 300 pounds steam pressure, 12 horse power; but as the steam is superheated it will develop from 15 to 18 horse power. The engine has thus reserve power sufficient for any emergency.

The steam chest, cover and joints are all ground fits, requiring no packing. The only packing used is at the piston rods. The stuffing boxes are made large, and consequently frequent packing is not necessary. The frame is roomy and easy of access.

The wearing surfaces generally are large, and the links, blocks and pins are hardened and ground. The bearings are all tool steel hardened clear through.

The burner is of the Bunsen type, made from two steel plates, which are tied together with steel tubes. The tubes and plates being of the same kind of material allows equal expansion, thus preventing the tubes from becoming loose and at the same time prevents the burner from warping.

The burner is kept in operation by the use of a pilot light which burns all the time, and is connected with a thermostat which regulates the fire.

The starting lever and reversing lever are both on the inside of the seat, at the right hand, and easy to handle.

A feed water pump attached to the cross head of the engine supplies the water necessary for the generator. There is also an emergency hand pump, with a long lever running perpendicular with the seat at the right hand side; but it is said to be rarely necessary to use it.

The steering is of the wheel type, and is composed of a box enclosing a nut to which is attached a bell crank. The device is so constructed that one complete revolution of the wheel will throw the steering wheels clear over. All the wear can be taken up by the adjustment of two nuts.

The brake is of the clam shell type, made from two pieces of solid bronze with no lining. The car, it is claimed, can be stopped in 10 feet when running at the rate of 10 miles per hour, and the action of the brake for rear motion is said to be positive, and it will hold the weight of the car on any hill, no matter how steep.

The seat is 39 inches wide by 22 inches deep; very roomy and handsomely upholstered with the best quality black leather. The painting is enamel, baked on and will not burn or blister.

The axles are equipped with high duty balls. The equalizing gear is of the spur type, dust proof and self oiling. The wheels are tubular steel; the spokes are steel tubes brazed into steel hubs and double steel rims. They will stand a strain of 19,000 pounds each. Goodrich pneumatic clincher G. & J. tires, 30x3 inches, are used, and a tubular steel, flexible running gear. The weight of the vehicle is 1,200 pounds.

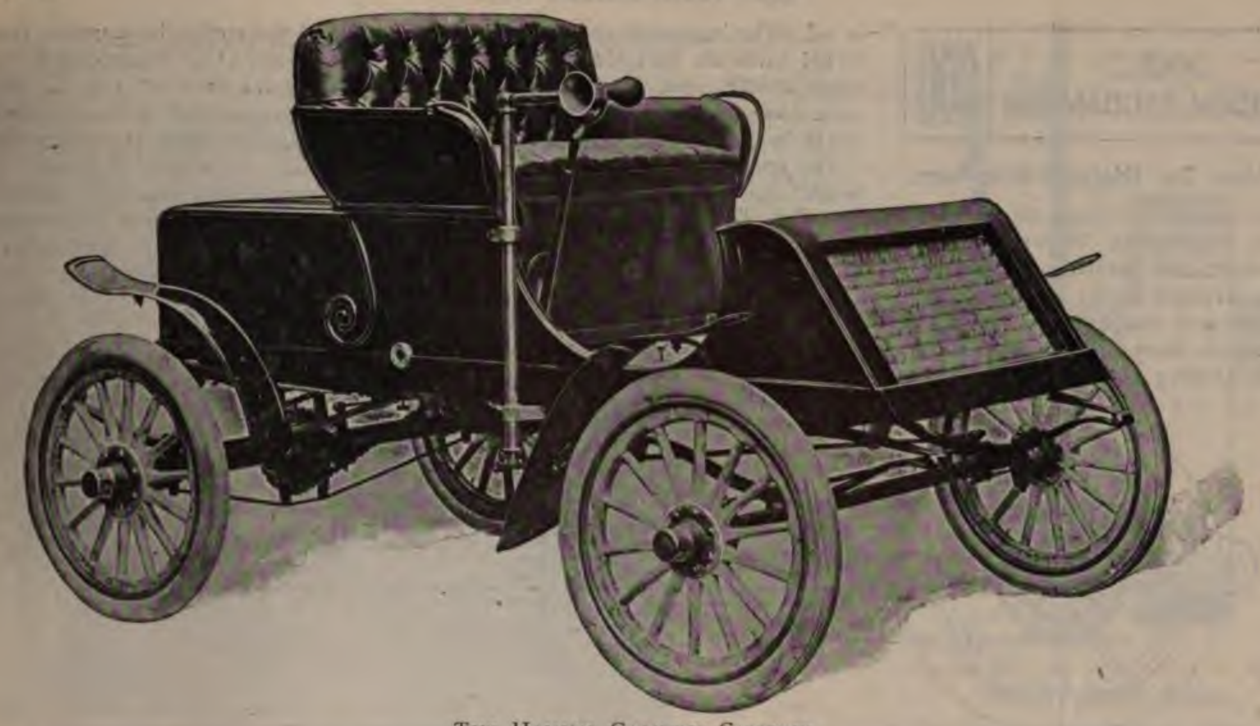
The Bray Automobile Jacks.

The Bray Manufacturing Company, of 115 Broadway, New York, are marketing two new styles of jacks, said to be particularly serviceable for automobiles because of their compact, portable character, and

THE BRAY JACK.

the ease with which they can be manipulated.

In one form the main screw stem is raised to an approximate height, and is held within its vertical base by a rack along its lower portion, which is engaged by a spring pawl. A sleeve which carries the head portion (mounted on ball bearings) is loosely screwed over the upper end of the screw stem, and carries an an-



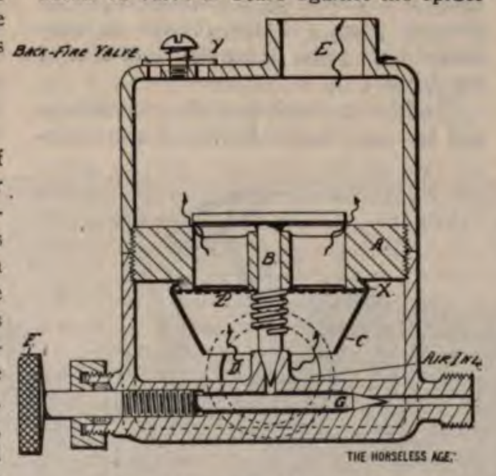
THE HANSEN GASOLINE CARRIAGE.

nular divided collar, having a pair of oppositely acting spring dogs, which latter respectively engage and slide over the teeth of a circular rack that extends from the screw stem, passing intermediate the divided collar. An operating arm is attached to the collar, being pivoted thereto to permit its lying parallel with the stem when not in use. This form is known as No. 1.

With the other form of jack made by this concern the final elevation of the vehicle is performed, after approximate adjustment, by means of an operating arm having a bifurcated cam end, pivoted to a stem and bearing beneath rollers on the movable head to elevate the latter with the upward swing of said arm. This form is known as O A.

The Hansen Gasoline Carriage.

The Hansen Automobile Company, of Cleveland, are among the latest to enter the automobile manufacturing field, although their experimental work extends back a number of years. They build a machine of medium weight with a single cylinder, four cycle engine of 4½ inches bore and 5¾ inches stroke. Touring tonneaus and racing machines also to be built will have double cylinder engines. The water tank, of about 6 quarts capacity, is fastened solidly to the cylinder and forms a part of the water jacket. The cooling coils are forward and circulation is maintained by a rotary pump. Perfect lubrication is effected by multiple oilers. Jump spark ignition is used. The vaporizer is of original design and claimed to give a perfect mixture under full or light load, throttled or wide open. A sectional view of same is shown in accompanying cut. It consists primarily of two shells screwed together by a nipple A. B is a valve operated by the suction of the air passing through the nipple A. A is so adjusted that when the gasoline valve is closed the aperture in A is also closed by the broad top of valve B. C is a sheet metal cone spun on A at X. Its duty is to give positive direction to the air which enters at D, travels through the cone C, raises valve B and carries with it the free gasoline which is let in around the conical point at the bottom of valve B. The air and gasoline then travel through the opening in A into the chamber above and thence to the engine. The thumb wheel F regulates the amount of gasoline at the needle valve G. A spring fastened to the shank of valve B bears against the spider



THE HANSEN VAPORIZER.

in nipple A to keep the valve in its seat. Y is a release valve which acts in case of back fire. Z is a wire gauze to break up the particles of gasoline as they are drawn through with the air.

Planetary transmission is used with spur compensating gear. Two forward speeds are controlled by one lever, while a foot lever is used for the reverse. A foot button operates the throttle, or accelerator, as it is called.

The body is hung on elliptical springs and a reachless running gear. The wheel base is 72 inches and the tread standard.

The machines are all equipped with either ball or roller bearings and military or wire wheels to suit purchaser.

The present capacity of the factory is said to be three per week, but negotiations are now being made to obtain about 35,000 square feet of floor space. When this is obtained the output will be increased to twelve per week.

The America Speed Controller.

A speed controller has been placed on the market by the America Speed Controller Company, whose place of business is at 14 Lafayette place, New York.

This controller comprises a circular plate, bearing on one surface a series of four annular racks having bevel teeth, separated by concentric intervening grooves.

A shaft that connects at one end with the motor shaft is journaled upon the plate support, lying rotatably across the annular racks on the plate, said shaft bearing, normally loose thereon, a series of four bevel gear wheels, while the shaft also bears a rigid key adapted to enter a slot in any one of the gear wheels to secure it thereto. Longitudinal movement of the shaft causes the successive fastening or keying thereto of the different gear wheels. Shifting is accomplished by a rod that connects with the hand lever, the rod lying parallel with the shaft across the plate and having a clutch member at its end which engages with a corresponding clutch member at the shaft end. The reverse is provided for by an oppositely arranged bevel gear wheel upon the shaft.

The advantages claimed for this device are simplicity, with economy, strength and efficiency. It is also claimed to be noiseless in operation.

...OUR... FOREIGN EXCHANGES

The New De Dietrich Carriage.

For a number of years the large De Dietrich Engineering Works, of Luneville, France, and Germany, manufactured gasoline carriages on the system of Amedée Bollée with double cylinder, horizontal motor in front, belt transmission to the rear, shifting gears for speed variation and bevel gear drive on to the rear wheels. Lately, that the tendency in design seems to be all in one direction, this system has become rather old fashioned and M. De Dietrich has now acquired a license for the manufacture of the Turcat-Mery vehicles which have already attained some prominence, notably by their endurance in the Paris-Vienna race.

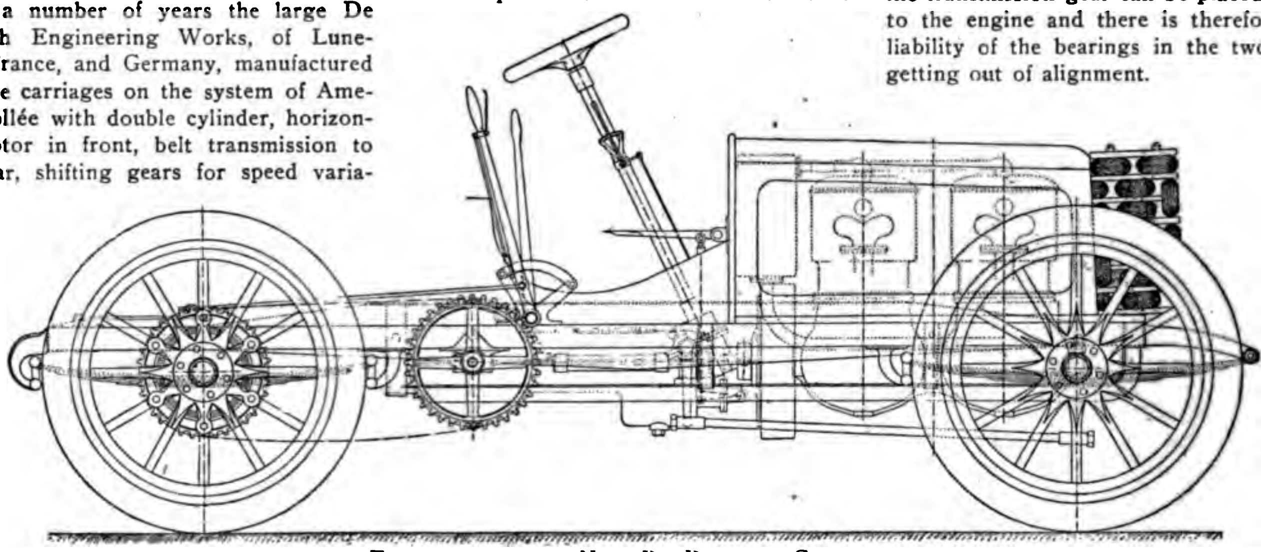
The general arrangement of the mechanism is the same as in the Panhard and most other French vehicles of the present. The motor is vertical and located in front and the speed is varied by means of shifting gears.

The motor has four cylinders and a balanced crank. All parts are said to be readily accessible and all wearing parts are enclosed in dust proof cases and run in oil. The inspection and removal of internal parts are facilitated by two lateral doors on the crank case. Through these same doors the ball governor, which is enclosed in the case, can be adjusted.

The ignition is electric, by "make and break" spark and the current is furnished by a magneto. The cooling water is circulated by means of a pump built especially large and driven by positive gearing. The water tank is attached to the dashboard and the arrangement of the cooling system is such that should the pump for any reason cease to operate the water will continue to circulate by thermosiphon action.

The carburetor comprises an automatic gasoline adjustment and a throttle which operate simultaneously and the motor is said to be extraordinarily flexible. The spark is advanced by a small lever on the steering post, and the throttle is controlled by a pedal under the right foot of the driver.

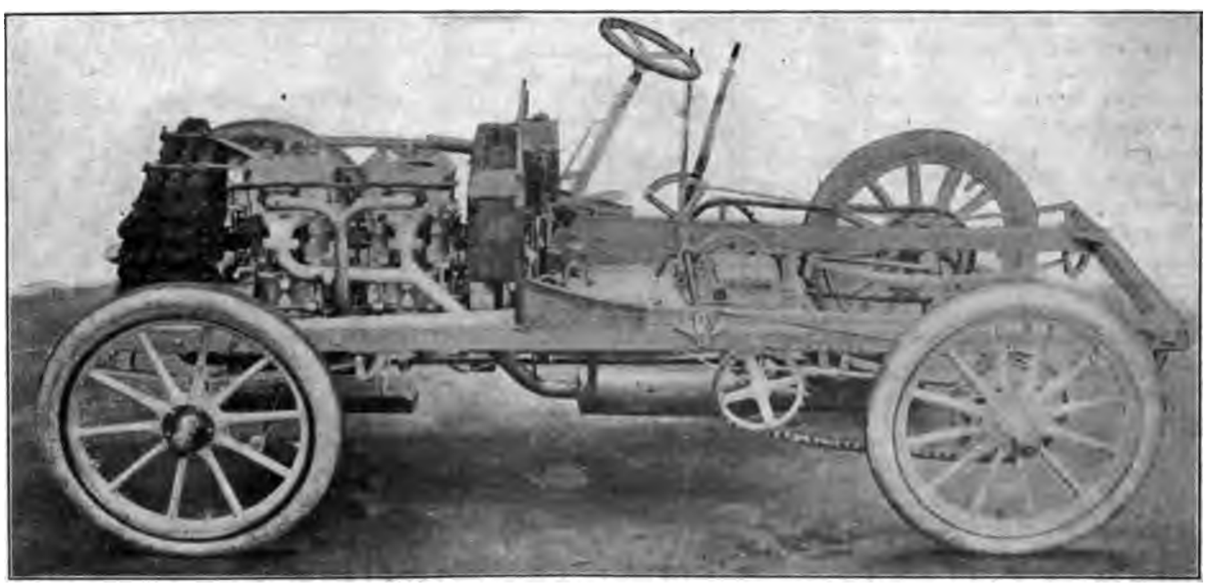
The friction clutch is of the conical type and has one original feature—the arrangement of the spring holding the clutch in engagement. This arrangement is illustrated by the drawing Fig. 4. It is at once apparent that in this position the spring is more accessible and more easily regulated. A further advantage is that the transmission gear can be placed closer to the engine and there is therefore less liability of the bearings in the two parts getting out of alignment.



Elevation of the New De Dietrich Carriage.

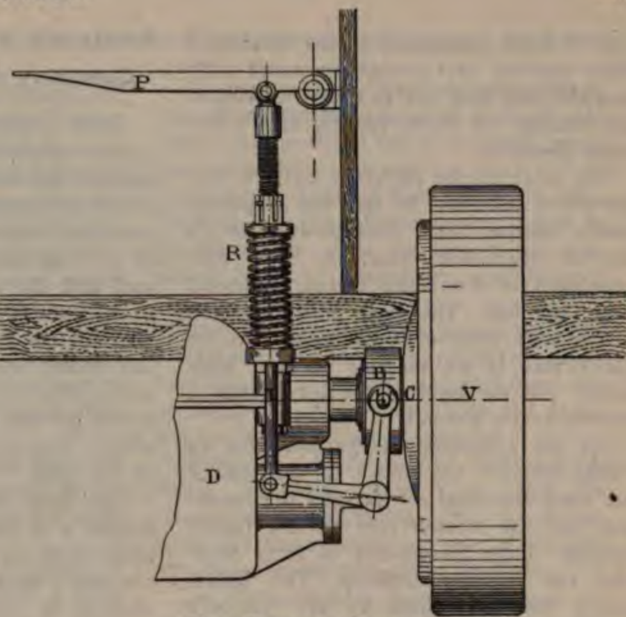
The change gear case is divided in halves along a horizontal line. The gears are all separate from each other so that in case one is worn out only that one needs to be replaced. A block brake is mounted on the differential shaft, which is operated by a foot lever. This brake, contrary to common practice, is not interconnected with the clutch in order that its braking effect may be added to that of the motor running as an air compressor. Finally, the rear wheels are provided with hub brakes.

In the variable gear the two gear shafts are placed side by side on the same level, which admits of keeping the centre of gravity low and at the same time clear the ground sufficiently to prevent trouble from this source.



Side View of Chassis.

Rear View of Chassis.



The Friction Clutch.

Prize Competition for Alcohol Propelled Goods Vehicles.

The German Agricultural Society is organizing a prize competition for automobile goods vehicles using alcohol as a fuel. In addition to the prize donated by the German Emperor, cash prizes aggregating 6,200 marks will be awarded to the successful competitors.

The entries will be divided into two classes: Class 1, motor wagons for the transportation of large loads (trucking); Class 2, motor wagons for delivery service and for use as milk wagons. The chief difference between the two classes is that in Class 1 may be entered traction vehicles which are intended to transport loads on trailer vehicles and in which the full weight and carrying capacity of the traction vehicle can therefore be utilized for the motor equipment. Such tractors are thought to be specially suitable for the transportation of such agricultural products as sugar beets, potatoes, alcohol, grain, feed and straw and for artificial fertilizers and coal. It is proposed to use as trailers the regular farm wagons, and during the time of loading and unloading only the trailer wagons are to stand idle, while the uncoupled tractor is to be used for other purposes during this period. There are in Germany a considerable number of large estates on which such motor tractors could be used all the year around. Now that it has been demonstrated that alcohol is an excellent fuel for explosive motors and offers material advantages compared with gasoline and kerosene for this purpose, the conditions are favorable to inaugurate the use of mechanical power for transportation on the public highway, a problem which so far, with steam traction engines, has always failed of solution on account of the frequent renewal of the water supply required.

In Class 2 vehicles will be entered intended for the transportation of small parcels and especially for milk. It is hoped that through the use of comparatively fast automobiles many farmers will be enabled to deliver their milk direct from the farms to the customers and avoid railroad transportation. It is further to be expected that on account of the higher speed of motor wagons the milk will be delivered with greater dispatch than is now possible, and also that it will suffer less from the vibration of the conveyance in which it is transported than is the case now. The trials will take place in the spring of 1903. Complete details may be obtained from the headquarters of the German Agricultural Society, 73 Kochstrasse, Berlin, S. W.

Darracq & Cie., of Paris, have opened a branch at Singapore, Straits Settlement, and will import Darracq carriages there.

At the election in Leeds, England, July 29, automobiles were used by the town clerk to make the round of the polling stations and also in the interest of the various candidates.

An international automobile exhibition will be held in Hamburg from October 3 to 12 next. The show, which is being organized by the Association of German Cycle Agents, will be held in the hall of the Rotherbaum Velodrome. Particulars of the forthcoming exhibition can be obtained on application to Mr. Löffler, Dammthorstrasse, 32, Hamburg.

The Welbeck Races.

The Automobile Club of Great Britain and Ireland held a series of races on a private track at Welbeck on Thursday, August 7. Much enterprise had been shown in the organization and the number of entries in the various events had reached 144, probably unprecedented in automobile track races. However, owing to various causes, one of which was certainly the extremely unfavorable weather, the actual number of competitors was only 63.

On Wednesday evening there was a dinner at the Victoria Station Hotel, Nottingham, which was presided over by E. W. Wells, one of the vice presidents of the automobile club. S. F. Edge and Charles Jarrott, the English racing champions, were sitting at his right. A considerable number of toasts were responded to and "the roads," "the sport" and automobile legislation received due attention by the speakers. Outside the rain poured in torrents all the while.

On the morning of the day of the race the weather was not a bit more favorable. Some trouble was experienced in the weighing of some of the foreign cars, which it seemed difficult to get within the weight limits of their respective classes. If the cars were just above the limit some small part was taken off, but this was in many cases objected to by the French chauffeurs, and as they did not speak English nor the weighing officials French the result of the protests and deliberations was that the machines went to the track as they were.

From Nottingham to Welbeck is a drive of 17 miles and this distance the racing and other machines had to run in the morning before the beginning of the races—at 10:30—at legal speed, below 12 miles an hour.

The first event was for motor bicycles, and only two out of nine entries ran. Four

out of eight entries ran in the section of light tourists' cars (weighing under 1,570 pounds) and nine out of twelve entries in the section for heavy touring cars (over 1,900 pounds).

The next on the program was the race for steam vehicles. In this the Serpollets easily outran their only competitor, a special locomobile racer, the same that competed in the Long Island boulevard race last fall. The best Serpollet time (there were three of these vehicles in the race) was 51 3-5 seconds for the kilometre and the time of the locomobile 1 minute 17 3-5 seconds.

All the preceding events were for so called tourists' machines. In the racing car class the chief events were the handicap and the scratch race for the fastest vehicle. Only fifteen out of forty vehicles ran in the handicap. The fastest actual time was made by Mr. Jarrott's 70 horse power Panhard, viz., 42 1-5 seconds, but he was scratch, and by Mr. Rolls' 20 horse power vehicle, also a Panhard, which had 24 4-5 seconds handicap, and covered the distance in 56 2-5 seconds, thus winning on his handicap time of 35 4-5 seconds. A protest was lodged against Mr. Rolls' car on the ground of carrying light weight.

The scratch race for the fastest vehicle was the last, and greatest, event of the day. Ten cars ran, one of which was disabled by a skid. Mr. Jarrott won this race on his 70 horse power Panhard, beating the next arrival at the winning post—a Darracq—by 10 seconds. On the same car Mr. Jarrott won earlier in the day the race for cars weighing less than 1,000 kilos. In this event he took 36 2-5 seconds, or 1 2-5 seconds more than his time in the scratch race.

Another event in the racing section was a scratch race for voiturettes, in which a 12 horse power Clement came in first.

In the motor bicycle events a Beeston 2 horse power Humber came in first in the race in the tourist section, while in the speed section a 2¾ horse power Orient was the winner.

In the competition for cars having the best appearance, the prize was won by H. Beeston for his 7 horse power Panhard, while the owners of a 16 horse power Napier and a 4 horse power Oldsmobile were highly commended.

Under the patronage of Prince Hohenlohe Oehringen a Continental automobile federation is being organized to deal with both racing and touring events. The federation is to embrace German and Austrian clubs, and possibly French. One of the first matters with which the association will concern itself will be the organization of a big tour between Berlin, Vienna, and Paris next year, as well as a monster automobile exhibition to be held in the spring of 1903 at Berlin.

Kerosene Number, May 28, 10 cents.

Receiver's Sale of the Automobile Company of America's Property.

There will be a public auction of the entire property and plant of the Automobile Company of America on Monday, September 8, on the premises, corner of West Side avenue and Broadway, Marion, Jersey City, N. J. The factory of the company is situated near the Marion Station of the main line of the Pennsylvania Railroad. The plot contains 3 acres, occupying an entire city block, with street frontages on four sides. The mean length of the plot is about 406 feet, and it is about 257 feet in width. The buildings cover about one-half of the land.

The main building is three stories in height, is of wooden construction, and has about 8,316 square feet of floor space. It contains a freight elevator. There are two engines in this building, one 250 horse power and the other 75 horse power, made by W. Wright. The boiler is a new 250 horse power Altman & Taylor. There is a full line of machinery and tools suitable for use in the construction of automobiles.

A secondary building, of brick, was erected in 1901. It is two stories in height, was built with an elevator shaft, but has no elevator. There are about 2,664 square feet of floor space. There is a small oil house, 5x10 feet, built of concrete.

The property of the company also includes a number of new, second hand and unfinished automobiles, viz.: (new), one 12 horse power surrey, one 12 horse power special Stanhope, ten 9 horse power Stanhopes; (second hand), four 4 cylinder touring cars, 20 horse power, one 12 horse power surrey, ten 9 horse power Stanhopes; (unfinished), one 6 cylinder 35 horse power touring car, six 12 horse power surreys, three 9 horse power Stanhopes. In addition there are new bodies (three aluminum tonneaus and three surreys) and unfinished bodies (nine tonneaus, twenty-four surreys and four Stanhopes).

The real property is subject to two mortgages, one for the principal sum of $50,000, the other for the principal sum of $15,000. The municipal taxes for 1900 and 1901 are also unpaid, aggregating, with the interest, about $3,000.

The property above described makes up a fully equipped plant, in which manufacturing operations may be continued at once. It is open for the inspection of prospective bidders each weekday until the sale from 9 a. m. to 5 p. m. Permits to enter the premises may be obtained on application to the master, Charles L. Carrick, at his office, No. 15 Exchange place, Jersey City, N. J. A duplicate of the receiver's inventory is in the posession of the master for the inspection of persons interested. The sale includes office furniture, fixtures, patent rights, trademarks, good will, patterns, drawings and book accounts. Henry C. C

Standard Warranty.

At the meeting of August 12 the National Association of Automobile Manufacturers adopted the following form of warranty as a standard:

"We warrant all goods furnished by us for sixty days following the date of their shipment, based upon the date of invoice covering the goods, this warranty being limited to the replacement in our factory of all parts giving out under normal service in consequence of defect of material or of workmanship.

"If the circumstances do not permit that the work shall be executed in our factory this guarantee is limited to the shipment, without charge, of the parts intended to replace those acknowledged to be defective.

"It is, however, understood that we make no warranty whatever regarding pneumatic tires or the batteries.

"We cannot accept any responsibility in connection with any of our motor cars when they have been altered or repaired outside of our factory.

"We are not responsible to the purchaser of our goods for any undertakings and warranties made by our agents beyond those expressed above.

"We wish it distinctly understood that we make no warranty of our goods except as stated above, but we desire and expect that customers shall make a thorough examination of our goods before purchasing."

New Process Raw Hide Pinions to Be Manufactured Abroad.

The New Process Raw Hide Company, of Syracuse, recently made arrangements with George Angus & Co., Limited, Newcastle-on-Tyne, England, one of the largest leather manufacturers in the United Kingdom, whereby the English concern is to establish a plant in England for the manufacture of raw hide gears and other products under the patents of the New Process Raw Hide Company, and using the latter company's trademark. This plant, it is expected, will take care of the company's business not only in Great Britain but throughout Europe, Messrs. Angus & Co. having offices in nearly all of the principal cities, and therefore being excellently situated to care for this trade.

A. Tait, the assistant manager of the Angus Company, recently spent two weeks at Syracuse, having come to this country specially to visit the works of the Raw Hide Company.

Upon Mr. Tait's return to England he will place orders with American firms for the latest gear making machinery, and will proceed at once with the fitting out of the new factory, which will be located at Newcastle-on-Tyne. Messrs. Angus & Co. have been the agents of the New Process Raw Hide Company in Great Britain for eight years, and have a well established trade in new process noiseless pinions.

MINOR MENTION

Lewiston, Mont., is to have an automobile line to carry the mails and passengers.

E. P. Moriarty, of Kansas City, Mo., has accepted the local agency for the Darracq.

William E. Metzger has just opened an automobile repository at Brush and Jefferson avenues, Detroit, Mich.

There is to be an automobile race at Council Bluffs, Ia., on September 1 next, at the Union Driving Park, of that city.

C. H. Blomstrom and N. M. Kaufman are organizing an automobile manufacturing company at Detroit, Mich. Their address is 64 Second street, Detroit.

The Rhode Island Automobile Club intends to hold a race meet at Narragansett Park, Providence, on September 24. Silver plate and cash prizes will be awarded.

The N. A. A. M. will take up the matter of rim standardization with a view of standardizing the spacing for lugs for single tube tires and rims for double tube tires.

The following machines are now represented in Kansas City, Mo.: Locomobile, Pierce, Haynes-Apperson, Friedman, Milwaukee, Rambler, Darling, Oldsmobile, Foster and Winton.

The Steam Carriage Boiler Company, of Oswego, has brought out a 24 inch boiler for the 60 horse power coach being made for Charles E. Ball. The coach is to run from the Waldorf-Astoria.

Edward K. Blaisdell, of Brooklyn, who recently had his machine fitted with a Salamandrine water tube boiler, states that he has since run over 2 measured miles in 2 minutes 35 seconds, which he could not do before.

The report of the trustees of the Milwaukee Automobile Company shows that total receipts have been $9,459.39. There was paid on secured claims $3,364.99, the expenses of administration were $3,936.22, leaving a balance of $2,157.18 on hand for distribution to make the 5 per cent. dividend.

A movement backed by Milwaukee men is on foot to establish an automobile line in Iron Mountain County, Mich., to take in the villages of Quinnesec, Norway, Vulcan, Lorette and Niagara, also the Spread Eagle summer resort. Six automobile carrettes seating twenty-four passengers each are to be bought.

The Consolidated Rubber Tire Company, of 40 Wall street, New York, whose business in New England during the past few years, according to Manager Cartmell, has been hampered because handled by an assignee instead of direct, have now established their own branch house at 48 Cortlandt street, Boston. Stanley F. Hall has been appointed manager, and the company will henceforth furnish their tires direct to customers as originally.

The Automobile Electric Company, of Chicago, has increased its capital from $2,000,000 to $3,000,000, says a report.

R. Gordon Rutter, a traveling salesman of the Cleveland Paper Company, has run a steam carriage 7,000 miles in his business.

C. G. Strang, of Colorado Springs, Col., has nearly completed a 20 horse power gasoline vehicle for C. E. Palmer, of the same place.

The United States Government has volunteered to pay 25 per cent. of the cost of the proposed macadam road from New York to Chicago.

The Adams-McMurtry Company, 317 West Fifty-ninth street, have taken the New York agency for the National Vehicle Company's electric vehicles.

The Sabraton Automobile Company, of Wheeling, W. Va., with a capital stock of $200,000, has secured a site and will begin the erection of an auotomobile factory.

The Springfield (Mass.) Automobile Club has made a deal with one of the local stations whereby its members are given special rates for storage, supplies and repairs.

Amza Biggs is now carrying the United States mail on the Huntington, L. I., rural free delivery route in his automobile. He covers the 22 miles in about two and a half hours with perfect satisfaction and great regularity.

The running gear of Geo. C. Cannon's racer, which did so well on the Brighton Beach track on Saturday, is the regular tubular running gear handled by Charles Miller, of New York.

The Cleveland Automobile Club took a run last Wednesday out to White's Villa, about 12 miles from Cleveland. After partaking of a sumptuous repast matters pertaining to the race meet September 16 were talked over.

The protest of Ernest Cuenod against the awarding of first prize to Percy Owens in the class for middleweight gasoline cars in the Staten Island speed trials has been rejected by the race committee of the Automobile Club of America.

Harold N. Brown recently made an automobile trip from New York to Boston via Port Chester, Stamford, Bridgeport, New Haven, Meriden, New Britain, Hartford, Springfield, Palmer, Spencer, Worcester and Warren; time, 13 hours.

The *Mail and Express* on August 23 announced a revolutionizing gasoline engine invention, consisting in the substitution for gasoline of "gas created from various hydrocarbons and chemicals," and referring to the inventors it says with much assurance: "They have succeeded in obtaining a gas from chemicals that works well in a combustion motor and at less than half what it would cost to secure the same power from gasoline." We wonder how the *Mail and Express* arrived at these figures as to cost when it couldn't get any more definite information regarding the alleged new fuel than that it is "a gas created from various hydrocarbons and chemicals."

Six new members were elected and several sub-committees appointed by the Rhode Island Automobile Club at a special meeting held a short time ago.

The State Railroad Commission of New York started from Syracuse on August 20 in automobiles over the line of the proposed Rochester, Syracuse and Eastern trolley road.

Mrs. Lucy L. Howe, a prominent New York society woman, was arrested at Babylon, L. I., on August 14, and fined for speeding her automobile above the speed allowed by the village ordinance.

Charles E. Patterson, of Patterson & Shaw, Brooklyn, New York, died on August 20 of pneumonia. He was an enthusiastic automobilist and one of the first to indulge in the pastime in Brooklyn.

The Hydra Double Battery Company recently had a fire at their factory in the General Electric Building, and have now secured new and commodious quarters at 70 and 72 Reade street, with 10,000 feet of floor space. They have begun to make deliveries from their new place of business.

The Sultan of Morocco escaped an automobile accident near Fez on August 21. His chauffeur lost control of the machine and ran into a stone wall. The Sultan being conservative, both as ruler and automobilist, was proceeding at a slow pace and in consequence escaped with nothing more serious than a little shaking up.

At the last meeting of the N. A. A. M. it was decided to recommend to the selling agencies of New York city that a charge of $25 be made for demonstrating a machine for a longer period than sixty minutes, and that tuition be charged for at the rate of $1 per hour, or any part of an hour. The idea is to protect the seller from imposition.

E. B. Martin and family, of Chicago, arrived in New York in their Packard automobile, the Flying Dutchman, on Saturday, August 23, after having been on the road thirteen days, including about three days laid over on account of rain. Owing to pressure of matter, we are compelled to hold over an account of the trip till next week.

A postal was recently received in Boston from Charles J. Glidden, who, with his wife, and Secretary Rust, of the Massachusetts Automobile Club, is making a European tour. The postal was written at Rheinfall bei Schaffhausen and said: "Germany 608 miles, England 62 miles, France 330 miles; total, 1,000 miles. Result, four punctures, one broken pump, and four hens, ten days' work."

The Anti-Auto Society and the village officials of Southampton, L. I., are trying to enforce the State laws concerning the speed of automobiles. The committee has sent out circular letters asking for the expression of opinion in regard to enforcing the laws governing automobiles. Only one unfavorable reply has been received.

Legislative and Legal.

Wilmette, Ill., has raised the automobile speed limit in the village to 12 miles an hour.

Bloomfield, N. J., has passed an ordinance limiting the speed of automobiles in the town to 8 miles an hour.

South Orange, N. J., has under consideration an ordinance limiting the speed of automobiles to 15 miles an hour.

The Chicago Board of Review assessed eighty-seven automobilists for their autos to an aggregate sum of $102,000.

Gloucester County, Pa., has adopted an automobile ordinance limiting speed to 8 and 12 miles in town and country respecttively.

In Trenton, N. J., an ordinance has been introduced limiting speed to 10 and 15 miles in densely populated and outlying districts respectively.

It seems certain that one of the first bills introduced in the next Indiana Legislature will propose to regulate the speed of automobiles on country roads.

At a meeting of the Chatham, N. J., Borough Council on August 11 an ordinance was introduced limiting the speed of automobiles and all vehicles propelled by power to 8 miles an hour and imposing a fine of $50, or thirty days' imprisonment, for violations.

The use of the Meadow Causeway, Long Island, for motor vehicles has been prohibited under a penalty of not less than $5 nor more than $20 for each offense. In addition to this penalty it is ordained that any violation of this ordinance shall constitute disorderly conduct.

At a dinner given in honor of the road committee of the Essex County Board of Freeholders by the Automobile Club of New Jersey at Pompton Plains on August 15 nearly every member of that board went on record as favoring the granting of a speed of 20 miles an hour to automobiles outside the limits of the city.

Edward C. Wallace, who has a summer home at Tuxedo, N. Y., was fined $25 by Justice of the Peace Charles H. Fisher, of Nyack, in June for violating on May 29 the speed law relating to automobiles. Supreme Court Justice Cochrane in Brooklyn on August 18 granted an order by which the judgment of Justice Fisher is to be carried to the County Court of Rockland County.

Secretary Shaw, of the Treasury Department, has decided that the privilege of free re-entry may be properly allowed all articles of foreign manufacture or production, under proper safeguard for the protection of the revenue, provided the articles so admitted shall not have been advanced in value or improved in condition as well abroad. The article must be registered, with a full description, at the custom house on exportation. Instructions to this effect have been issued to the Collector at New York. Heretofore the department has held that, no matter how many times an article of foreign manufacture is brought into this country, it must pay duty every time.

Automobile Accidents.

The chauffeur of C. Gray Dinsmore had an accident at Houlgate, France, with a 40 horse power automobile on August 17 in which he received severe injuries.

A broken front axle was the cause of an accident to an automobile occupied by Clarence English, of Evanston, Ill., and two ladies at Llewellyn Park on August 20. All three were thrown out, but none seriously hurt.

An automobile driven by R. C. Davis overturned at Cottage Grove avenue and Sixtieth street, Chicago, on August 13, and injured its occupants. The driver made a sudden turn to avoid another vehicle, and this caused the vehicle to turn over.

J. C. B. Woods, of Providence, R. I., while driving in his touring car on the evening of August 13, had a collision with a trolley car and was thrown out. Mr. Woods was severely injured, his back being sprained and his left collar bone broken.

Charles Jeffery, of T. B. Jeffery & Co., and Engineer Potts, of the same firm, had a narrow escape on August 17, when an automobile in which the two were riding ran off a bridge into a ditch. The accident occurred on the Geneva road, a mile west of Kenosha. The chauffeurs attempted to yield the right of the road to a team and plunged into the ditch.

Report on Inquest Into Scott Accident.

Judge Eldridge's report on the inquest into the death of Ariel B. Scott was filed August 12. He finds that Edward A. Mulliken did not exercise every reasonable precaution in the management of the automobile. The report is as follows:

Report of an inquest held August 5, 1902, on the death of Ariel B. Scott, late of West Tisbury, in Dukes County: From the testimony of witnesses under examination at the inquest it appears:

That the said Ariel B. Scott, on the afternoon of the eighteenth day of July, A. D. 1902, was upon the State highway leading from Vineyard Haven to West Tisbury. He was riding upon a wagon load of shingles, which was drawn by a horse owned by himself, and which he was accustomed to drive. When he had reached a point on the State highway nearly opposite the easterly end of the Vineyard Haven golf grounds he was overtaken and passed by an automobile or motor vehicle controlled by one Edward A. Mulliken, at which his horse took fright and became unmanageable and ran away, thereby causing him to fall or be thrown to the ground, and as a result of such fall he received certain severe injuries, and that he died at his home in West Tisbury on the ninet
July, A. D. 1902.

I find that the said Ariel B
to his death by reason of the
tained in the manner describe
that the said Edward A. Mull
operate, manage and control t
mobile, or motor vehicle, in
as to exercise every reasonabl
to prevent the frightening of
and to insure the safety of the
((Signed) EDMUND G. E
Justice of the District Cour
County.

From the Report of the sioner of Patent

In 1901 there were receive
plications for mechanical pa
applications for design patent
cations for reissues of patent
plications for registration of
1,064 applications for registrati
and 233 applications for reg
prints. There were 27,292 pat
including designs, 81 patent
1,928 trademarks registered,
and 159 prints. The number
that expired was 19,147.

The total expenditures were
64. The receipts over expend
$152,012.52. The total balan
credit of the Patent Office in
ury of the United States on
1902, was $5,329,471.07.

In proportion to population
ents were issued to citizens o
cut than to those of any other
every 1,198. Next in order a
lowing: District of Columbia,
1,296; Massachusetts, 1 to e
New Jersey, 1 to every 1,5
Island, 1 to every 1,581; Col
every 1,718; New York, 1 to e
California, 1 to every 1,959; Il
every 1,984; Pennsylvania, 1
2,221; Ohio, 1 to every 2,417.

As to foreign patents, 1,045 w
to residents of Germany; 986 t
England; 376 to those of Cana
those of France; 156 to those
Hungary.

The number of patents issued
the largest in the history of t
Office.

Trade Literature Rec

Valves, Injectors, Lubricators
Specialties—The Lunkenheimer
of Cincinnati, Ohio.

Automobile Lamps—Gray &
Amesbury, Mass.

The Auto-Quadricycle—Geo.
don, 267 Halsey street, Newark,

Automobiles, Automobile Runn
Automobile Parts.—The Brecht
bile Company, of St. Louis, Mo.

Metropolitan Injectors—The
Derby Manufacturing Company,
Liberty street, New York.

Rules and Regulations of the A. C. A. 500 Mile Reliability Run.

I.

It will be assumed that every contestant is acquainted with the rules of the contest, and by entering therein he agrees to abide by said rules. In the event of dispute concerning the interpretation of the rules the decision of the contest committee shall be final. The committee reserve the right to alter or amend these rules from time to time as they may deem expedient.

II. Limit to Number of Vehicles.

The contest will be open to all classes of self propelled vehicles, made in the United States or abroad, so constructed that at least two passengers are carried seated side by side, but no manufacturer, agent or private owner shall be allowed to enter more than three vehicles in any one class.

Entry blanks will be forwarded by the club secretary upon request, and must be filled out in full.

III. Entries.

(a) The time for receiving entries will expire on September 25, 1902.

(b) All entries *must* be accompanied by the following information in full:

Weight of the vehicle, including fuel, supplies and equipment; water capacity, gasoline capacity; name of manufacturer; place of manufacture; tires, make, size, weight, double or single tube, retail price; number of passengers the vehicle can carry; motive power; rated horse power of the motor and number of cylinders.

For electric vehicles:

Weight of battery, number of cells, ampere hour capacity.

No entry will be received unless every question on the entry blank is answered, nor will any entry be received unless accompanied by the entrance fee.

IV. Entrance Fees.

(a) The entrance fee for all classes, motor cycles excepted, up to and including September 10, 1902, will be $50 for each vehicle. In the motor cycle class the entrance fee will be $25 for each vehicle. After September 10, 10 per cent. will be added to the entrance fee for all classes.

(b) The entrance fee shall be paid by check to the order of the treasurer of the club, and be forwarded to the club secretary with the entry.

(c) Each person making an entry agrees that in the event of the vehicle being disqualified or failing to take part in the contest the entry fee shall be retained by the club.

(d) The club shall have the right to refuse an entry without stating any reasons.

V. Basis of Classification.

All vehicles, whether electric, steam, gasoline or otherwise, shall operate in the same class, which classification shall be on the basis of weight.

VI. Classification and Division.

Vehicles shall be divided into the following classes: All four wheeled vehicles to carry two or more persons. (Three wheeled vehicles carrying two passengers side by side and conforming in all other respects to four wheeled vehicles to be provided for by special arrangement in Classes A or B.)

Class A—Under 1,000 pound class. Four wheeled motor vehicles weighing under 1,000 pounds, in commercial running and operating condition, with all tools, fuel and supplies on board.

Class B—1,000 to 2,000 pound class. Four wheeled motor vehicles weighing 1,000 and less than 2,000 pounds, in commercial running and operating condition, with all tools, fuel and supplies on board.

Class C—2,000 pound and over class. Four wheeled motor vehicles weighing 2,000 pounds or over in commercial running and operating condition, with all tools, fuel and supplies on board.

Class D—Motor cycle class. Motor bicycles, motor tricycles and motor quadricycles.

VII. Electric Vehicles.

Electric vehicles may recharge or replace batteries at noon and night controls without penalty. All other rechargings or replacements will be counted as penalized stops, and the length of time thus consumed will be noted by the observer.

VIII. Weighing of Vehicles.

All parties making entries for the contest shall appear before the committee at the Automobile Club on Tuesday, October 7, 1902, between the hours of 9 a. m. and 6 p. m., and after receiving their official number shall go to a place designated by the committee, and have their vehicle weighed and an official seal affixed thereto.

The committee reserve the right, at the time of weighing, to reject any vehicle, if they see fit to do so, and return the entrance fee.

IX. Observers.

(a) Every vehicle shall carry an official observer, who will be provided by the club. Each observer will be provided with a distinctive badge, bearing the official number of the vehicle in which he is to ride, which must be conspicuously worn on the outside of the coat.

(b) Observers will record the actual time of the start and completion of the contest, and also the time of all stoppages from the actual stop to the actual start of the wheels, from whatever cause, and the cause of each stop must be recorded in full on the record sheets with which they will be provided.

(c) Observers will also keep an accurate and detailed record of any repairs made to the vehicle en route, at the noon control, and during the morning hours from 7 o'clock a. m. to 9 o'clock a. m., allowed each day for repairs and adjustment.

(d) It shall be the duty of the official observer to caution the operator of the vehicle in which he rides when he has used less time between controls than that shown on the schedule, but any caution or lack of caution from the observer is not to relieve the operator of the vehicle from his responsibility concerning the speed. Should the observer's caution be disregarded, it shall be the duty of the observer to note this fact upon his record sheet.

(e) Observers may render any assistance within their power to the operator of the vehicle.

Instructions to Observers.

(a) The official observer for each vehicle will be assigned to the vehicle in which he is to ride one week in advance of the date of starting. He will be informed of the name and address of the owner of the vehicle and its official number, and be furnished with the rules and program of the contest, and a badge corresponding to the number of the vehicle. The owner of the vehicle will at the same time be advised of the name and address of the observer who has been assigned to his vehicle.

(b) If for any reason the observer finds he will be unable to start, he must at once notify the owner by telegraph of this fact; also the club secretary, and return his badge to the secretary, who will immediately assign another observer to such vehicle.

(c) If, on the other hand, the owner for any reason finds his vehicle will not be able to start, it shall be his duty to notify the club and also his observer of this fact by telegraph, and the observer can then report to the club secretary and receive another assignment.

(d) Each observer will provide himself with a watch, which he will set by the clock over the window of the Plaza Bank. He will also provide himself with a mackintosh and a small cap, and with lead pencils or a fountain pen.

(e) It shall be the duty of the observer to report to the vehicle to which he has been assigned at 8:30 a. m. on the morning of the start and not leave it except during noon or night stops, or in case of illness. Should an observer at any time be incapacitated from continuing the run, he will turn over his time card and official badge to the operator of the vehicle, who will complete the record as far as the next control, where a new observer will be provided.

(f) Coupons for hotel accommodations at noon and night stops will be mailed to observers before the start.

(g) If during the progress of the run a vehicle in which an observer rides is for any reason unable to continue, the observer may take train to New York and at once turn in to the club: (1) Memorandum of the cost of his railway transportation, which will be paid by the club; (2) his unused hotel coupons; (3) his official time book.

(h) On the morning of each day of the run it shall be the duty of the official observer to report to his vehicle at the garage at 7 o'clock, when it is turned over to its owner, and remain with it as far as possible until it is ready for the start at 9 a. m. During this time he shall keep a record of all repairs made to the vehicle or replacement of parts.

(i) He shall also keep a careful record

of repairs made en route throughout the entire run, note what supplies are taken on between controls and for electric vehicles the time consumed in recharging or replacement of batteries.

(j) At the noon control the observer must also record any repairs that may be made during the stop for luncheon.

(k) On arriving at the night control the official observer shall remain with his vehicle until its tanks have been filled with water and gasoline, and it has been placed in the garage in charge of the committee's guards. No adjustment or repairs are to be made on the vehicle on arrival at the night control or while it is receiving water and gasoline.

(l) The observer will sign and surrender his record book to the timekeeper in New York immediately after the finish of the contest.

X. Controls.

(a) Controls are to be officially established at the beginning of each day's run, at luncheon places and at the end of each day's run. The start is to be made each morning at 9 o'clock, and an hour and a half will be allowed for luncheon, except that any contestant arriving at the noon control at 1 o'clock or after will be allowed but one hour for luncheon. He will be called one hour after the time of his arrival, and his time will be counted from the time that he is called; but no vehicle will be allowed to leave the noon control before 2 o'clock.

(b) During the luncheon hour at the noon control contestants may take on fuel, which will be available, and make such adjustments and repairs as can be accomplished with the tools and extra parts carried on the vehicle, and with such *local* assistance as may be readily obtained under ordinary touring conditions, but will not be permitted to have work done on their vehicles by their mechanics or assistants travelling by train.

(c) The times for opening and closing controls will be modified according to the conditions which may arise during the contest.

The noon control will open at 11 a. m. and close at 4:30 p. m.

The night control will open at 4 p. m. and remain open until 9:30 p. m.

(d) The time of arrival of each vehicle at the point of control will be recorded by the officials at control on the record sheets and also on the record book of the official observer of the vehicle.

(e) The site of control will be designated by a red flag with the word "CONTROL" prominently printed thereon in black. This flag will be prominently displayed on both sides of the road at the point of control. There will be notification by means of a green flag 200 yards in advance of the control point as a warning of the approach to the control.

(f) Controls are to be established in the following manner: If a green flag is displayed, the vehicle shall slow down to a speed of not to exceed 8 miles per hour until a white flag is passed, when speed may be resumed as before. On coming to a red flag, the vehicle shall come to a full stop until the driver is permitted by the steward to proceed. At night lanterns similarly colored may be used instead of flags.

Night Controls.

(g) There will be at each night's stopping place a storage enclosure in charge of a superintendent and assistants, for the storage of vehicles for the night. Watchmen will be on duty during the night.

(h) On the arrival of each vehicle at the night control its tanks must be filled with water and gasoline in the street outside of the storage enclosure or garage, where supplies will be available, but the vehicle shall receive absolutely no other attention and must be immediately placed in the garage. All fires on steam vehicles, all lamps used for ignition and all lamps used for illumination must be extinguished before the vehicle is placed in the garage.

(i) At 7 a. m. each contestant may take his vehicle and, under the eye of the official observer, make such lubrication, adjustments and repairs as may be necessary. No one will be permitted to enter the garage, except the official observer, the owner or driver of a vehicle and his mechanic, and such local assistants as may be employed. Contestants will not be permitted to have mechanics or assistants traveling by train to do work on their vehicles.

(j) No fires on steam vehicles, no lamps for ignition or illuminating purposes on automobiles, are to be lighted in the garage during the morning hours allowed for repairs or adjustment.

Smoking in the Garage Will Be Strictly Prohibited at All Times.

(k) Each vehicle shall be ready to start at 9 a. m. sharp. If a vehicle is not ready to start when it is called, time will be taken for such vehicle, and any delay in starting will be charged against it.

(l) The club has made arrangements for an adequate supply of gasoline at the noon and night controls, which may be purchased by contestants. Contestants will make their own arrangements for lubricants.

Contestants needing supplies at other than the noon and night controls will be required to make their own arrangements for same. Official observers will note what supplies are taken on between controls.

XI. Repairs.

No replacing of engines, boilers, axles or wheels will be allowed. Such repairs only will be permitted as can be accomplished with the tools and extra parts carried on the vehicle and with such local assistance as may be readily obtained under ordinary touring conditions.

XII. Starts and Stops.

(a) Vehicles will be started from the control the first morning at 9 o'clock. At the time of starting from each control the vehicles shall approach the starting line and take their places one behind the other in the order of their approach to the starting line, leaving a space of at least 10 feet between every two vehicles. As each vehicle starts, the others shall move up one place.

(b) Vehicles approaching control points shall follow the same rule as at starting points.

(c) If it becomes necessary for a vehicle to stop, it must first be driven to the extreme right of the road as nearly as practicable.

(d) All stops from whatever cause will be timed and recorded by the official observers. Stops for the following causes will be considered involuntary stops and will not count against the vehicle, although such stoppages must be recorded as set forth above:

1. Compulsory stop of 1½ hours for luncheon, which will be made at specified places indicated in the program.
2. Road blocked by traffic.
3. Tire troubles (See Rule XIV).
4. Stoppages by police.
5. To avoid frightening timid horses.
6. To render aid in case of accident.
7. Blocked railroad crossing.
8. Demands of nature.
9. To recover articles accidentally dropped from vehicle.
10. To light carriage lamps.

(e) Steam vehicles will be allowed a total of 20 minutes stoppage for gasoline and water between controls in each half day's run, for which marks will *not* be deducted. One mark per minute will be deducted for time thus consumed in excess of 20 minutes.

XIII. System of Marking for Reliability.

There will be a maximum number of marks for reliability for each day's run, viz.: First day, New York to New Haven, 79 miles, 316 marks; second day, New Haven to Springfield, 68.6 miles, 274.4 marks; third day, Springfield to Boston, 96.6 miles, 386.4 marks; fourth day, Boston to Springfield, 96.6 miles, 386.4 marks; fifth day, Springfield to New Haven, 68.6 miles, 274.4 marks; sixth day, New Haven to New York, 79 miles, 316 marks. Total, 1,953.2 marks.

This number is based on an average speed of 15 miles an hour, or four minutes to the mile. The maximum number of marks for each day's run is ascertained by multiplying the number of miles by 4. Thus New York to New Haven, 79 miles × 4 equals 316 (minutes) marks, which represents a clean run at an average speed of 15 miles per horse power, and one mark will be deducted for each minute the vehicle is at rest from the time of starting to the conclusion of a day's run, except the involuntary stops mentioned in Rule XII.

Thus if penalized stops amounting to 30 minutes are made during the day, 30 marks are deducted. 316 minus 30 equals 286 total reliability marks for the day. In like manner if a vehicle on account of

slower speed takes more than 316 minutes to cover the 79 miles (exclusive of involuntary stops) one mark is deducted for each minute in excess of 316 minutes.

PRIZE FOR RELIABILITY.

A cup presented by the president of the club will be awarded by the committee to the vehicle showing the greatest number of reliability marks at the end of the contest.

XIV. TIRES.

Stoppages on account of tire troubles will not be counted against a vehicle. An accurate record, however, will be kept of all delays occasioned by tires. Such record will be published in the official report of the contest and will state the exact nature of the mishap and the time necessary to repair the same. The entry blanks will require specific information of the tires on each vehicle, including maker's name, retail price, size, weight, and whether single or double tube.

XV. SPEED.

(a) An average speed of 8 miles per hour (exclusive of the non-penalized stops mentioned in Rule XII) must be maintained over the whole course to render a vehicle eligible for a certificate. A contestant falling below an average of 8 miles per hour in any period (half day's run) will not receive any credit for that period.

(b) On passing a green flag, which will be placed on the right side of the road at the entrance to all towns, on the outward journey, no speed in excess of 8 miles per hour will be permitted until a white flag is reached, when a speed not exceeding 15 miles an hour will be permitted.

No average speed for each day's run in excess of 15 miles per hour will be recognized or permitted.

(c) Vehicles are not permitted to make up the time lost during penalized or during non-penalized stops by exceeding an average rate of speed of 15 miles per hour, but the time lost during non-penalized stops will be credited upon arrival at controls.

(d) The contest committee shall have power to disqualify a vehicle for traveling at a speed, in any place, which they may consider excessive, without reference to these rules.

(e) Any driver, owner, nominator or manufacturer of any vehicle taking part in the contest who shall be disqualified shall have his or their names reported to the secretary of the American Automobile Association, and such driver, owner, nominator or manufacturer will be disqualified by said association.

XVI. OPERATORS.

There will be no restriction as to operators of vehicles, but no change of operators will be permitted except within the confines of a control.

XVII. PASSENGERS.

In classes A, B and C each vehicle shall carry at least two persons, one of whom shall be the official observer appointed by the club. These may be changed and others substituted within the confines of any control, but if passengers be changed outside of control the vehicle shall be subject to disqualification.

XVIII. CLASS, LETTER AND NUMBER.

(a) Each contesting vehicle must have securely attached to it in a conspicuous position on both front and rear or side an official letter and number corresponding with the catalogue class and number. There shall be no other mark or sign on any vehicle other than the owner's initials and the manufacturer's usual name or number plates as affixed to a vehicle when sold to a customer.

(b) Those having charge of vehicle will be held responsible for the numbers being in conspicuous position and clearly legible at all times.

XIX. ROAD REGULATIONS.

(a) All vehicles passing other vehicles going in the same direction must pass to the left in accordance with the rules of the road, and vehicles meeting each other must pass to the right. If for any reason it is necessary for vehicles to travel on the left side of the roadway, such vehicles must cross to the right side, irrespective of the condition of the roads, as soon as signaled by an overtaking or an approaching vehicle.

Vehicles must signal one another when approaching in either direction.

(b) No vehicle shall be pushed or assisted by anyone other than its occupants under penalty of disqualification, except that the penalty for a vehicle being towed in any period shall be disqualification for that period (a period being a half day's run).

(c) Contestants shall be responsible for any violation of law and for all civil and criminal penalties.

(d) Contestants must comply with the traffic regulations of the local police.

(e) If a contestant fails to stop his vehicle on request from the driver of a frightened horse, or in any manner shows himself inconsiderate of other users of the roadway, his vehicle shall be subject to disqualification.

(f) Contestants shall inform themselves thoroughly in regard to the route, and no allowance will be made for any mistakes they may make.

(g) No contestant shall take any route other than that laid down in the official maps, which will be furnished for each stage.

XX. MUFFLERS.

Every vehicle will be required to have an efficient muffler, which must be attached to the vehicle. Running with open mufflers will not be permitted.

XXI. DISQUALIFICATION.

(a) Disqualification shall mean that on notice being served on any vehicle it shall cease to run in the contest, and shall not receive a certificate or mention in the records.

(b) A person on receiving notice of disqualification shall withdraw his vehicle and immediately remove the official number therefrom.

(c) No notice of disqualification shall be served unless the person in charge of the vehicle has first been notified of the act which it is claimed should disqualify the vehicle. If the act be disputed, disqualification shall be postponed until the contest committee, at a meeting to which all concerned shall be invited, shall take evidence and render their decision.

(d) The person so disqualified shall have no claim on the club of any kind or nature whatsoever. See Rule XV (e).

XXII. PROTESTS.

Anyone desiring to enter a protest must deposit with a member of the committee ten ($10) dollars, which sum will be retained by the club if the protest is not sustained. He must submit his protest in writing, within twenty-four hours of the time, when it will be considered by the committee at the earliest practicable moment and decision rendered.

XXIII. CERTIFICATES.

(a) The committee shall post the result of each day's run as soon as practicable, and may furnish the same to the press.

(b) Contestants shall not publish or communicate for publication any other times than those contained in the club certificate.

(c) In the event of subsequent alteration by the committee of the records on the certificates, owing to protests or other causes, the contestant will only publish the record as amended, on pain of disqualification.

(d) The certificates will recognize no speeds in excess of 15 miles an hour, and will state as follows:

Official number; class; maker; entered by; weight. Tires: Make, weight, size, single or double tube and retail price. Number of passengers carried; distance; average miles per hour for the six days; percentage of reliability mark.

XXIV. AWARDS.

Certificates will be awarded by the club as follows:

First class certificate, average speed from 12 to 15 miles per hour.

Second class certificate, average speed from 10 to 12 miles per hour.

Third class certificate, average speed from 8 to 10 miles per hour.

XXV. STAGES.

	Miles.
First stage—From Club House to New Haven	79
Second stage—From New Haven to Springfield	68.6
Third stage—From Springfield to Boston	96.6
(Remaining in Boston one day.)	
Fourth stage—From Boston to Springfield	96.6
Fifth stage—From Springfield to New Haven	68.6
Sixth stage—From New Haven to New York	79
Total	488.4

XXVI. FINISHING OF THE CONTEST.

The finish of the contest will be made at the flag in front of the club house, No. 753 Fifth avenue, corner of Fifty-eighth street, New York.

List of Automobile Owners as Filed in the Office of the Secretary of State at Albany.

(Continued.)

Smith, A. M., 3 Tillotson Block, Canandaigua, N. Y.
Stevens, Richard, 1 Newark street, Hoboken, N. J.
Schwarzkopf, E. E., Park Row Building, New York city.
Snell, Frank, Waterville, N. Y.
Shattuck, Albert R., 19 North Washington square, New York city.
Skinner, K. A., Boston, Mass.
Setter, Alonso G., Collins Centre, N. Y.
Schenck, V. R., 95 Liberty street, New York city.
Sawyer-Man Electric Company, 510-530 West Twenty-third street, New York city.
Smith, Augustine J., Lawrence, L. I.
Stern, Irving C., 32 West Twenty-third street, New York city.
Stevens, Eben, care Hollister & Babcock, Mills Building, New York city.
Sidenberg, Gustavus, 48 West Fifty-sixth street, New York city.
Stralem, Casimir I., Hotel Majestic, New York city.

Taylor, Joseph B., 6 Riverside avenue, Rensselaer, N. Y.
Thompson, S. W., Owego, N. Y.
Taylor, B. L., Watertown, N. Y.
Troy Automobile Company, 550 Fulton street, Troy, N. Y.
Thomas, George W., 30 Lake View Park, Rochester.
Thaw, Edward, 1 West Seventy-second street, New York city.
Tyng, Stephen H., Jr., Broadway and Seventeenth street, New York city.
Thomas, Thomas H., 11 Broadway, New York city.
Taber, William I., Herkimer, N. Y.
Tamblin, James H., Copenhagen, N. Y.
Todd, A. H., Griffin Corners, N. Y.
Thomas Brothers, Stuyvesant, N. Y.
Tschudin, Henry and Charles, 566 Amsterdam avenue, New York city.
Taber, William, Poughkeepsie, N. Y.
Thebaud, Paul G., 87 Broad street, New York city.
Thomas, Orlando F., Lyons, N. Y.
Theller, C. A., 34 West street, New York city.
Traxel, Charles, Vernon, N. Y.
Tompkins, Ralph S., Fishkill-on-Hudson, N. Y.
Tyler, Walter L., 89 Linden Boulevard, Brooklyn, New York.
Todd, William E., Fayetteville, N. Y.
Tobias, F., Knickerbocker A. C., New York city.
Terbell, J. B., Corning, N. Y.
Terwilliger, Wm. H., Amsterdam, N. Y.
Terhune, Frank, Passaic, N. J.
Taylor, Talbot J., 30 Broad street, New York city.
Thatford, G. Stuart, 2471 Atlantic avenue, Brooklyn, N. Y.
Terhune, Howard, 267 Paulison avenue, Passaic, N. J.
Thomas, John G., Little Falls, N. Y.
Taylor, W. C., 5 Wall street, New York city.
Tomlinson, D. W., Jr., Batavia, N. Y.
Tyler, George H., 315 River street, Troy, N. Y.
Tower, Joseph T., 542 Fifth avenue, New York city.
Taylor, Henry R., Metropolitan Club, New York city.
Tangeman, C. H., 276 Berkeley place, Brooklyn, New York.
Tilden, John N., Peekskill, N. Y.
Tilden, John N., Jr., Peekskill, N. Y.

Unser, Josephine M., Carthage, N. Y.
United States Government, by C. Van Cott, postmaster, New York city.
Underhill, Daniel, Jr., 26 Court street, Brooklyn, New York.

Van Auken, D. J., Geneva, N. Y.
Van Vliet, William B., Johnstown, N. Y.
Veghte, Augustus, Watervliet, N. Y.
Van Anden, William M., 65 Pierrepont street, Brooklyn, New York.
Van Kuren, L. A., Binghamton, N. Y.
Valentine, Samuel H., 44 East Fifty-seventh street, New York city.
Von der Linden, Herman, Poughkeepsie, N. Y.
Van Benschoten, J., Poughkeepsie, N. Y.
Veeder, DeWitt, 6 University place, Schenectady, N. Y.
Verney, Frederick, Sayville, L. I.
Van der Berg, Francis, Jr., 262 St. Nicholas avenue, New York city.
Vanderbilt, Alfred G., Dobbs Ferry, N. Y.
Varian, C. E., Plainfield, N. J.
Valentine, F. S., Roslyn, N. Y.
Van Vleck, W. D., 35 Nassau street, New York city.
Von Deilen, W. D., 42 Fourth avenue, New York city.
Vanderbilt, W. K., Jr., Newport, R. I.
Vanderbilt, Reginald, 1 West Fifty-seventh street, New York city.

Walter, William, 316 West 140th street, New York.
Wilkin, T. D., Syracuse, N. Y.
Webb, Frank G., 81 Willoughby street, Brooklyn, New York.
Weller, J. L., 41-45 Elwood Building, Rochester.
Wilcox, H. K., Middletown, N. Y.
Walters, J. W., 143 West Fifty-first street, New York city.
Warner, J. Foster, 109 Throop street, Rochester.
Woers, Charles H., 1 East Sixty-third street, New York.
Warner, Lucien C., 632 Broadway, Irvington, N. Y.
Williams, H. C., 346 Broadway, New York.
Ward, L. F., Marathon, N. Y.
Weaver, George M., Syracuse, N. Y.
Wood, Edgar T., 117 West 121st street, New York city.
Winton Motor Carriage Company, 150 East Fifty-eighth street, New York city.
Ward, Charles J., Binghamton, N. Y.
Washburne, Louis F., Ossining, N. Y.
White, Park J., 19 West Thirty-first street, New York city.
Weller, Theodore A., Middletown, N. Y.
Wolfe, William H., Binghamton, N. Y.
Weston, C. S., Scranton, Pa.
White, Stamford, 121 East Twenty-first street, New York city.
Warner, G. E., 72 Lakeview avenue, Buffalo, N. Y.
Waldron, George, 408 Plymouth avenue, Rochester.
Whipple, H. W., East Orange, N. J.
Wilson, Francis A., 45 Sidney place, Brooklyn, New York.
Willis, Henry, 299 West avenue, Rochester.
Woodworth, H. S., Rochester, N. Y.
Whitney, Charles W., 331 Madison avenue, New York city.
Wightman, Frank L., 245 West Water street, Syracuse.
Wills, Charles T., 156 Fifth avenue, New York city.
Watson, James S., 11 Prince street, New York city.
Wyckoff, C. F., Ithaca, N. Y.
Winthrop, W. R., 44 Pine street, New York city.
Wood, Clarence W., 310 West Eighty-second street, New York city.
Williamson, William W., Palmyra, N. Y.
Watson, Arthur K. L., Black Rock, Bridgeport, Conn.
Williams, L. L., Rochester, N. Y.
Wurster, F. W., 107 Rodney street, Brooklyn, New York.
Webber, Otto, 99 Sixth avenue, New York city.
Wehrhane, Henry H., 252 West Ninety-ninth street, New York city.
Work, Frank, Jr., Oyster Bay, N. Y.
Work, John Clinton, Oyster Bay, N. Y.
Weston, Edward, 645 High street, Newark, N. J.
Wickwire, C. F., & Sons, Cortland, N. Y.
Weser, John A., 423 West Forty-third street, New York city.
Wheaton, L. S., 8 Central avenue, Newark, N. J.
White, Raymond S., Great River, Long Island.
Williamson, W. W., Syracuse, N. Y.
Wheeler, John H., 276 Sixth avenue, Brooklyn, New York.
White, Howard G., 4 West Ninety-third street, New York city.
Wheeler, Seth, Albany, N. Y.
Whipple, H. W., 44 and 46 Wall street, New York city.
Waldo, Rhinelander, Union Club, New York city.
Wells, A. Judson, 381 Franklin street, Buffalo, N. Y.
Whitney, Albert, Whitney Crossing, Allegany County, N. Y.
Whitney, G. W., Auburn, N. Y.
Woodruff, George L., 27 East Twenty-second street, New York city.
Williams, Charles H., 121 North Pearl street, Buffalo.
Wenzel, Charles, Huntington, N. Y.
West, Andrew F., 184 Morris avenue, Buffalo.
Waters, George H., 2835 Boulevard, Jersey City, N. J.
Wait, George W., Sandy Hill, N. Y.
White Sewing Machine Company, 22 Union square, New York city.
Warren, Lloyd, 3 East Thirty-third street, New York city.
Whitney, H. P., 871 Fifth avenue, New York city.
Weeber, C. F., Jr., 255 Sherman street, Albany, N. Y.

Young, Lewis G., 19 East Fifty-fourth street, New York city.
Yothers, Horace, Owego, N. Y.
Yawger, I. C., 21 Maiden lane, New York city.
Young, Mary P., 1346 Brooklyn avenue, Brooklyn, New York.
Young, David, 8 Central avenue, Newark, N. J.

Zahm, Edward, 117 Sherwood avenue, Syracuse.

(Registered from October 1, 1901, to April 1, 1902.)
Anderson, Larz, Weld, Brookline, Mass.
Annus, Ernest G., 223 Green street, Schenectady, N. Y.
Agens, Fred. T., 414 Cumberland street, Brooklyn, New York.
Armstrong, W. W., Rochester, N. Y.
Auger, Charles L., 654 Hudson street, New York city.
Alexander Harry, 18 West Thirty-fourth street, New York city.
Avery, R. B., Auburn, N. Y.

Booss, D. E., 45 West Fifty-first street, New York city.
Beebe, Anna P., Hotel San Remo, New York city.
Bourne, A. K., Oakdale, N. Y.
Butt, Mrs. McCoskry, 8 West Fifty-second street, New York city.
Blair, J. Insley, 33 Wall street, New York city.
Bloodgood, E. F., 327 West Eighty-ninth street, New York city.
Barmore, Marion K., 628 West 147th street, New York city.
Bulley, G. W., 410 West 115th street, New York city.
Brandreth, Ralph, 274 Canal street, New York city.
Batcheller, Henry, 44 Fifth avenue, New York city.
Buckingham, C. H., Poughkeepsie, N. Y.
Barber, Chas. B., 155 Hancock street, Brooklyn, New York.
Brand, William, 74 Van Dyke street, Brooklyn, New York.
Brown, William Bruce, 180 West Fifty-ninth street, New York city.
Blair, Jos. A., 343 West End avenue, New York city.
Brokaw, Mrs. C. V., 825 Fifth avenue, New York city.
Butler, Arthur W., 35 Wall street, New York city.
Bourne, Frederick G., Oakdale, N. Y.
Barhite, John A., Rochester, N. Y.
Brokaw, William G., 771 Madison avenue, New York city.
Buttles, M. S., Dr., Hotel Savoy, New York city.
Bull, Irving C., Middletown, N. Y.
Beck, Dr. U. G., 411 East Church street, Elmira, N. Y.
Bartlett, Geo. E., 47 Brevoort place, Brooklyn, New York.
Baker, C. W., 42 Orchard street, Brooklyn, New York.
Buckheimer, Adolph, 705 Grand street, Brooklyn, New York.
Bissell, Dr. Elmer J., Rochester, N. Y.

Crowell, Wm. B., 1044 Fifth avenue, New York city.
Content, Harry, 62 East Seventy-ninth street, New York city.
Curtis, B. Farquhar, 7 East Forty-first street, New York city.
Crane, Clinton H., 52 Broadway, New York city.
Carpenter, W. J., Katonah, N. Y.
Cimiotti, F. F., 104 West Eighty-seventh street, New York city.
Curry, M. W., 816 West End avenue, New York city.
Clements, Geo. P., Dr., 60 St. Nicholas avenue, New York city.
Carey, Chauncey S., M. D., Elmira, N. Y.
Cochrane, A. W. S., 1 West Thirtieth street, New York city.
Chrisholm, H. J., 813 Fifth avenue, New York city.
Crowell, W., 2 Tryon road, New York city.
Cornell, Annie, 24 East Forty-fifth street, New York city.
Curtin, Frank, Gloversville, N. Y.
Chamberlain, Geo. F., Harrison, N. Y.
Chamberlain, A. Ward, Auto. Club, New York city.
Carlson, F., 2790 Broadway, New York city.
Cooke, Chas. D., 654 Hudson street, New York city.
Curtiss, F. A., 33 Hatfield place, Port Richmond, N. Y.
Cooper Brothers, Cortland, N. Y.
Crowell, William, 1044 Fifth avenue, New York city.

Danley, F. R., Attica, N. Y.
Dennison, Chas. E., Clyde, N. Y.
De Freest, Mrs. Geo. B., 14 East Fiftieth street, New York city.
De Forest, Louis, 14 East Fiftieth street, New York city.
Doolente, Chas. A., 417 Genesee street, Utica, N. Y.
Dewing, H. E., Yale Club, 30 West Forty-fourth street, New York city.
Davis, J. Edward, 9 Broad street, New York city.
Despard, Walter D., 6 Hanover street, New York city.
Dundas, Ralph Wurt, Hotel St. Andrews, New York city.
Dyer, Elisha, Jr., 12 West Thirty-sixth street, New York city.
Davidson, Robert T., 693 Bushwick avenue, Brooklyn, New York.
Duerr, C. A., Bedford Park, New York city.
Durand, John S., 146 Broadway, New York city.
Daniels, Samuel A., Waterville, N. Y.

Ellinwood, E. M., Clyde, N. Y.
Euley, Jay Noble, 11-13 William street, New York city.

Fellows, Gordon, Knickerbocker Club, New York city.
Fogarty, W. P., 302 West Eighty-sixth street, New York city.
Fowler, William, 626 Washington street, New York city.
Frohman, Charles, Empire Theatre, New York city.
Ferguson, Samuel, G. E. Works, Schenectady, N. Y.
Finley, A. D., Port Chester, N. Y.
Farlee, R. D., 11 Wall street, New York city.
Fletcher, W. H., 654 Hudson street, New York city.
Falls, Thos. J., 120 Liberty street, New York city.
Ford, Francis W., 8 James street, New York city.

Fleck, F. F., 54 Bleecker street, New York city.
Frederick, W. J., 228 Summer street, Buffalo, N. Y.

Gallatin, R. H., 62 Cedar street, New York city.
Grugon, Chas. D., 10 East Fifty-third street, New York city.
Gilmour, J. Morrison, 55 West Sixteenth street, New York city.
Gillespie, Samuel H., 8 Fletcher street, New York city.
Graves, William Leon, 10 East Seventy-seventh street, New York city.
Griscom, C. A., Jr., 2d, Pier 14 North River, New York city.
Goldschmidt, George, 50 Broadway, New York city.
Gallatin, Gowlet, 37 Wall street, New York city.
Guggenheim, Sol R., 743 Fifth avenue, New York city.
Glidder, Chas. J., Hotel Touraine, Boston, Mass.
Gray, B. D., 35 West Thirty-fourth street, New York city.
Grosvenor, Mrs. M. J. L., 723 Fifth avenue, New York city.
Gaiser, Geo. A., 621 Ferry avenue, Niagara Falls, N. Y.
Greer, Austin M., Larchmont Manor, New York city.
Gould, Will L., 21 King street, New York city.
Gaeded, Robert, 654 Hudson street, New York city.
Griffen, John D., 304 West Ninetieth street, New York city.
Gillette, J. Frederic, 222 East Seventeenth street, New York city.
Gurnee, W. S., 3d, 29 Broadway, New York city.

Hemstreet, J. V., Herkimer, N. Y.
Haynes, J. W., South Manchester, Conn.
Honigman, Isaiah, 213 West Seventy-eighth street, New York city.
Hallenbeck, Orlando J., Canandaigua, N. Y.
Hatch, Walter C., 176 West Eighty-first street, New York city.
Havemeyer, Hector H., 10 East Fifty-seventh street, New York city.
Hendrix, Clifford R., 882 Carroll street, Brooklyn, New York.
Hollister, Frederick K., 59 East Fifty-second street, New York city.
Hupfel, J. Chr. G., 148 East Thirty-seventh street, New York city.
Hilts, George D., 51 Jay street, Albany, N. Y.
Hines, H. A. C., 3 West Ninety-eighth street, New York city.
Hopkins, George B., 120 Broadway, New York city.
Hollins, F. C., 11 Wall street, New York city.
Hatch, F. H., 30 Broad street, New York city.
Hall, W. A., 74 John street, New York city.
Havemeyer, F. C., 244 Madison avenue, New York city.
Humphreys, Fred. N., 1233 Webster avenue, New York city.
Hohenstein, Henry, 564 Grand street, New York city.
Hartley, Thomas R., 5825 Fifth avenue, Pittsburg.
Hardenburg, D. B., Middletown, N. Y.
Heinsheimer, Louis A., 17 West Seventieth street, New York city.
Heule, Emil, M. D., 350 Willis avenue, New York city.
Hewitt, Peter C. (2), 11 Lexington avenue, New York city.
Halsey, Henry, Waldorf-Astoria, New York city.
Harriman, Mrs. H. E., 18 East Thirty-second street, New York city.
Hustace, Francis, 413 Madison avenue, New York city.

Iselin, W. E., New Rochelle, N. Y.
Iselin, Lewis, 3 West Fifty-second street, New York city.

James, Walter B., 17 West Fifty-fourth street, New York city.
Johnson, Burt C., 1404 Main street, Buffalo, N. Y.
Jones, E. Clarence, 1 Nassau street, New York city.
Johnson, F. A., 114 West Seventy-eighth street, New York city.
Jones, Howard S., 583 Jefferson avenue, Brooklyn, New York.
Jones, D. Edward, Lowville, N. Y.
Jeffries, Ferdinand M., 955 Trinity avenue, New York city.
Jefferson, W. W., Lambs' Club, New York city.

Kelly, Geo., M. D., 3 East Seventy-third street, New York city.
Kent, Percy, 6 West 122d street, New York city.
Kniskern, A. C., M. D., Mechanicville, N. Y.

Law, James, 19 East 127th street, New York city.
Laidlaw, C. E., 49 West Eighty-fifth street, New York city.
Leighton, Wm. T., Rochester, N. Y.
Limburger, E. A., 110 West Fifty-seventh street, New York city.
Livingston, Joe, 50 Broadway, New York city.
Lewisohn, Jesse, 11 Broadway, New York city.
Lazerlere, Chas. F., 76 Elm street, New York city.
Letchworth, Ogden F., 605 Niagara street, New York city.
Leonard, Chas. P., Lowville, N. Y.
Lyon, Whitney, 317 West Eighty-eighth street, New York city.
Lasier, J. F. D., 17 Nassau street, New York city.

Leeds, Warner M., 21 State street, New York city.
Lindberg, O., 662 Baltic street, Brooklyn, New York.
Lockwood, F. F., New York Produce Exchange Building, New York city.

Martin, J. B., Hotel Martin, New York city.
Miller, Geo. N., care The Grove, Rhinebeck, N. Y.
Moulton, Arthur J., 27 West Thirty-ninth street, New York city.
Morris, Dave H., 269 West Seventy-second street, New York city.
Meyers, E. J., 1312 Main street, Buffalo, N. Y.
Morrell, Robert L., 2 East Forty-fifth street, New York city.
Morse, Geo. E., 11-13 William street, New York city.
Mackay, Clarence H., 253 Broadway, New York city.
Maginn, Miss Bonnie, 400 West Fifty-seventh street, New York city.
Mason, Henry J., 661 Putnam avenue, Brooklyn, New York.
Mallette, J. L., 257 Hamilton street, Albany, N. Y.
Monell, F. B., 31 Broadway, New York city.
Martin, Howard, 247 Lark street, Albany, N. Y.
Meyers, E. L., 45 East Sixtieth street, New York city.
Mittag, Frank O., Park Ridge, N. J.
Macdonald, J. Oliver, 23 Garrison street, Paterson, N. J.
McGarvey, David S., Thurlow Terrace, Albany, N. Y.
Macdonald, Geo. A., Dr., 31 East Sixty-seventh street, New York city.
McGregor, B. B. (2), 26 Broadway, New York city.
McKee, Frank, 56 West Thirty-third street, New York city.
McClune, Fred. A., Ithaca, N. Y.
McGarvey, Alden, Thurlow Terrace, Albany, N. Y.
Macaulay, E. F., Ticonderoga, N. Y.

Newbold, Frederick R., Poughkeepsie, N. Y.
Norton, W. P., 33 Wall street, New York city.
Norwood, W. E., 521 West State street, Ithaca, N. Y.

Oliver, Wm. B., Jr., 16 East Seventieth street, New York city.
Oelrichs, Mrs. Herman, 1 East Fifty-seventh street, New York city.
Osborn, J. Wesley, Fairport, N. Y.
Oldring, Geo. H., 581 Jefferson avenue, Brooklyn, New York.
Orth, Gustavus A., Jr., 74 Cranberry street, Brooklyn, New York.
Otis, Ray F., Batavia, N. Y.

Postley, Clarence A., 817 Fifth avenue, New York city.
Poillon, J. J. H., 273 West 134th street, New York city.
Pell, Alfred D., 929 Fifth avenue, New York city.
Proctor, C. E., Carnegie Studio, New York city.
Post, Geo. B., Jr., 15 Broad street, New York city.
Peck, Herman T., M. D., 321 Halsey street, Brooklyn, New York.
Pelton, C. E., Lowville, N. Y.
Parmenter, John, 519 Franklin street, Buffalo, N. Y.
Proctor, James H., 5 West Forty-seventh street, New York city.
Pulitzer, Ralph, 58 East Seventy-ninth street, New York city.
Pettit, F., 2 Wall street, New York city.
Proctor, James H., 5 West Forty-seventh street, New York city.
Palmer, Chas. L., 274 State street, Albany, N. Y.

Quayle, Oliver A., 13 North Pearl street, Albany, N. Y.
Quackenbush, J. B., Closter, Bergen County, N. J.

Reesler, August, 141 Broadway, New York city.
Riker, A. P., 200 West Seventieth street, New York city.
Rice, Edwin W., Jr., Schenectady, N. Y.
Robinson Motor Vehicle Company, Boston, Mass.
Robison, Wm., 18 Wall street, New York city.
Roper, F. E., M. D., Norwich, N. Y.
Robinson, Isaac R., 56 Beaver street, New York city.
Riglander, M. M., 35 Maiden lane, New York city.
Rothschild, Monroe C., 40 Wall street, New York city.
Rusk, John W., Haines Falls, N. Y.
Rothschild, C. A., 466 Broadway, New York city.

Stern, Irving C., 32 West Twenty-third street, New York city.
Sidenberg, Gustavus, 48 West Fifty-sixth street, New York city.
Stralem, Casimir I., Hotel Majestic, New York city.
Spelman, William H., 432 Sixth street, Brooklyn, New York.
Somerville, C. Stuart, 68 Pine street, New York city.
Schmidt, C. F., Jr., 24 Beaver street, New York city.
Sutton, John W., 645 Carroll street, Brooklyn, New York.
Steamobile Company of America, Keene, N. H., also 73 Fifth avenue, New York city.
Simpson, Oswald L., 143 West Seventy-second street, New York city.

Schultz, Carl H., 430 First avenue, New York city.
Stevens, Eben, Mills Building, New York city.
Stokes, W. C., 66 Broadway, New York city.
Stilson, Robert L., 514 Pearl street, New York city.
Straus, Charles, 317 West Seventy-fifth street, New York city.
Smith, J. Gardner, M. D., 21 West 122d street, New York city.
Strong, Dr. C. J., 60 West Seventy-fifth street, New York city.
Stewart, Albert A., 37 Fifth avenue, New York city.
Smith, R. A. C., 100 Broadway, New York city.
Stephani, Ph. F., 240 Madison avenue, Syracuse, N. Y.
Seaman, Albert W., 16 Exchange street, New York city.
Simpson, Albert A., Poughkeepsie, N. Y.
Schoonmaker, Frank L., Hotel Netherland, New York city.
Streit, Richard A., 8 Central avenue, Newark, N. J.
Shain, Charles D., 11 Broadway, New York city.
Smyth, George A., 2926 Boulevard, Jersey City, N. J.
Snyder, Charles F., Summit and Pavonia avenues, Jersey City, N. J.
Sargent, W. D., Hotel Majestic, New York city.
Sherman, John R., Port Henry, N. Y.
Sibley, Hiram W., Rochester, N. Y.

Thornley, J. P., Hotel San Remo, New York city.
Tallman, S. C., Auburn, N. Y.
Tiermann, L. J., 2168 Seventh avenue, New York city.
Tangemann, G. P., 276 Berkeley place, Brooklyn, New York.
Twist, C. H., Utica and Main streets, Buffalo, N. Y.
Thomson, Amidon, Belle Haven, Greenwich, Conn.
Taylor, W. C., 5 Wall street, New York city.
Taylor, Russell E., 1275 Madison avenue, New York city.
Thomas, Edward R., 17 West Fifty-seventh street, New York city.
Thomas Brothers, Stuyvesant, N. Y.
Tyson, A. H., 25 Broad street, New York city.
Taylor, C. E., St. Johnsville, N. Y.

Vandenburg, Wm. H., 32 West Forty-ninth street, New York city.
Vrooman, Charles S. V., Schenectady, N. Y.
Vanderbilt, Reginald, 1 West Fifty-seventh street, New York city.
Voorhees, John J., 57 Duncan avenue, New York city.
Van Ostrand, J. P., Ithaca, N. Y.

Watson, James S., 11 Prince street, Rochester, N. Y.
Weeber, C. F., Jr., 255 Sherman street, Albany, N. Y.
Wyckoff, C. F., Ithaca, N. Y.
Wright, Robert K., New York Yacht Club, New York city.
Wheeler, Schuyler S., 107 East Fortieth street, New York city.
Whipple, H. W., 44 Wall street, New York city.
Walker, Keitt P., 62 East Eighty-first street, New York city.
Waters, James M., 500 Madison avenue, New York city.
Wishart, Frederick, 2 East Forty-fifth street, New York city.
Williams, Winslow T., 54 East Fifty-third street, New York city.
Winthrop, W. R., 44 Pine street, New York city.
Wertheim, H. P., Morristown, N. J.
Wallace, E. K., 19 East Sixty-ninth street, New York city.
Weston, Edward, 645 High street, Newark, N. J.
Whiting, Albert Hart, 49 West Forty-fourth street, New York city.
Wright, George W., Poughkeepsie, N. Y.
Wyman, John E., 110 Central Park West, New York city.
Washburne, Louis F., 14 Ellis avenue, Ossining, N. Y.

Young, Lewis G., 19 East Fifty-fourth street, New York city.

Zehnder, C. H., 40 Wall street, New York city.

(To be continued.)

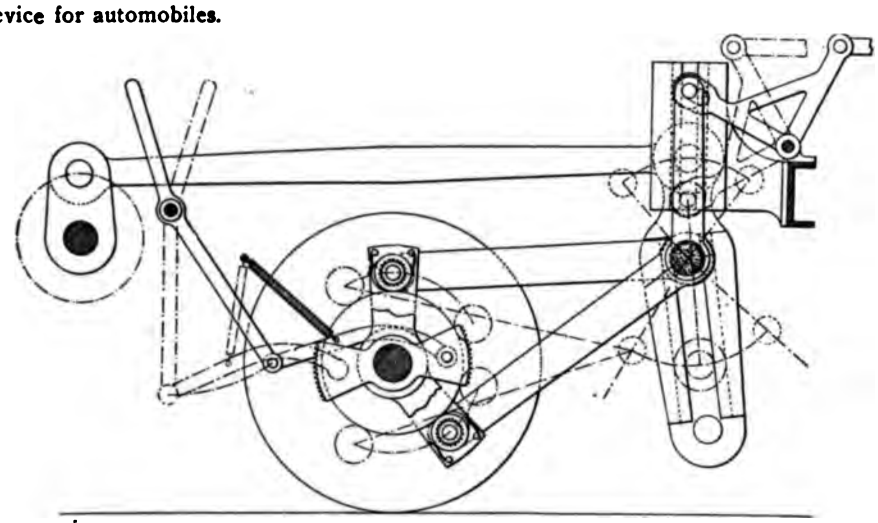
Ordinary paints, when coated on any heated surfaces, as boiler chimneys, smoke boxes, cylinder ends, usually blister and fall from the work. The following preparation will be found very efficient for this class of work: Procure 3 pounds lampblack, 3 pounds blacklead, 1 pound black oxide of manganese, 1 pint japan gold size, ½ pint turpentine, and 1 pint boiled linseed oil. Powder the blacklead and mix all the ingredients well together to a uniform consistency, and apply two coats as ordinary paints.

MOTOR VEHICLE PATENTS..

United States Patents.

706,580. Driving Gear for Varying Speed and Reversing.—William and G. F. Meischke-Smith, of Dresden, Germany. August 12, 1902. Filed January 10, 1902.

Relates to a variable throw transmission device for automobiles.



No. 706,580.

From a crank on the motor shaft through a connecting rod and arm reciprocating motion is given to a rocking shaft and arms upon it. These arms have slots, in which, by means of a link and bell crank worked by a hand lever, a pin can be caused to slide to greater or less radial distance from the axis of the rocking shaft. The pin is linked by two connecting rods to two arms mounted free to turn on the driving axle of the car. On these arms are mounted rollers, each having parts of its circumference made prominent in form of a cam, on which cam part the one or the other of a pair of springs bears, so as to press it against the circumference of a disk fixed on the axle. The arms provided with the cams are caused to reciprocate a greater or smaller distance, according to whether the sliding pin is a greater or smaller distance from the rocking shaft. When the arms reciprocate one of the cams, by its frictional pressure on the disk, causes it to turn, the other cam slipping, and when the arms move in the other direction the other cam acts on the disk, causing it to turn in the same direction as before. Thus by continuous reciprocation of the arms continuous rotation is given to the disk and its shaft, with speed depending on the stroke of the arms, as determined by manipulation of the hand lever.

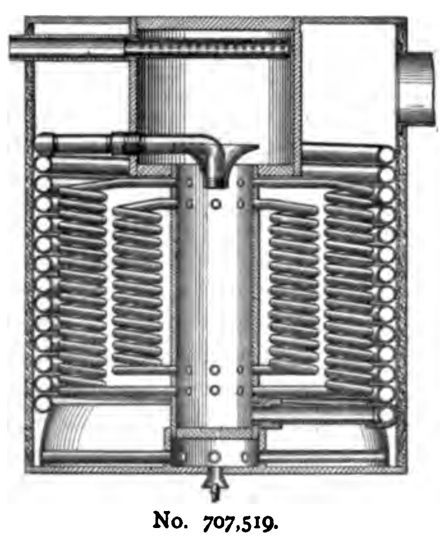
The gear so far as described suffices in sixty cases where the driven shaft has always to move in one direction; but when reversal is required a pair of toothed segments is mounted free to turn on the driving axle and the cams are formed with spur teeth at their end. When it is desired to reverse the segments are swung around by means of a hand lever and link, and as the segments pass the cams their teeth mutually engage and the cams are so far turned as to bring their raised portion around to the opposite side in each case, so that their effect on the disk is to turn it in the direction opposite to that in which they previously turned it. The cams and disk may be made with grooves and ridges in the manner of frictional gear.

707,478. Valve Mechanism for Steam Carriage Burners.—Rollin H. White, of Cleveland, Ohio. August 19, 1902. Filed April 19, 1901.

The gasoline valve to the burner can be opened directly by a handwheel at the side of the carriage, from the ground, and through bevel gears by means of a handwheel convenient to the operator when seated in the carriage.

707,519. Boiler.—August W. Ofeldt, of Newark, N. J. August 19, 1902. Filed September 28, 1901.

Spirally wound generating coils are arranged about a central drum and communicate therewith at the top and bottom. The number of coils may be varied as desired. A spiral coil formed of pipe of larger size than the generating coils surrounds these coils and the water chamber and forms, substantially, a wall to prevent excessive radiation of heat from the boiler. This coil is connected with the water chamber at the bottom thereof, and is also connected with the water chamber at the top thereof by a pipe, projecting through the side of the steam chamber and bent downwardly. This coil therefore forms a portion of the circulating system of the boiler. It also forms a means whereby the feed water may be heated before entering the water chamber.



No. 707,519.

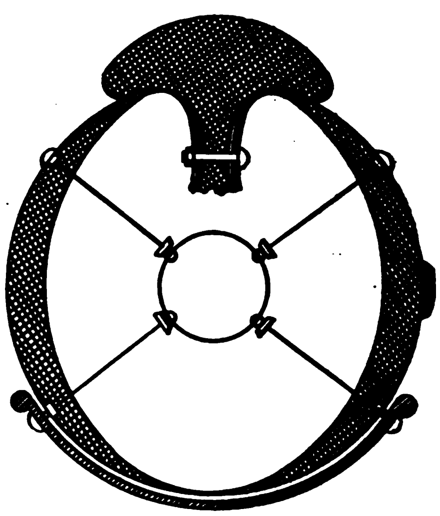
At the lower end of the coil, where it connects to the nipple forming the communication with the water chamber, is inserted a T, to the third side of which is connected the water feed pipe, the feed water being introduced in such direction that it tends to flow directly into the coil rather than into the nipple, so that said feed water helps to maintain the circulation through the coil. The coil is surrounded by the usual casing of sheet metal lagged with asbestos.

To the end of the pipe forming the upper termination of the outer coil in the chamber is fastened a baffle plate.

707,304. Motor Lawn Mower.—Thomas and William H. Caldwell, of Newburgh, N. Y. August 19, 1902. Filed March 7, 1902.

707,378. Tire for Vehicle Wheels.—E. Belledin-Gras and F. S. De Mondran, of Paris, France. August 19, 1902. Filed May 10, 1902.

This tire is essentially constituted by



No. 707,378.

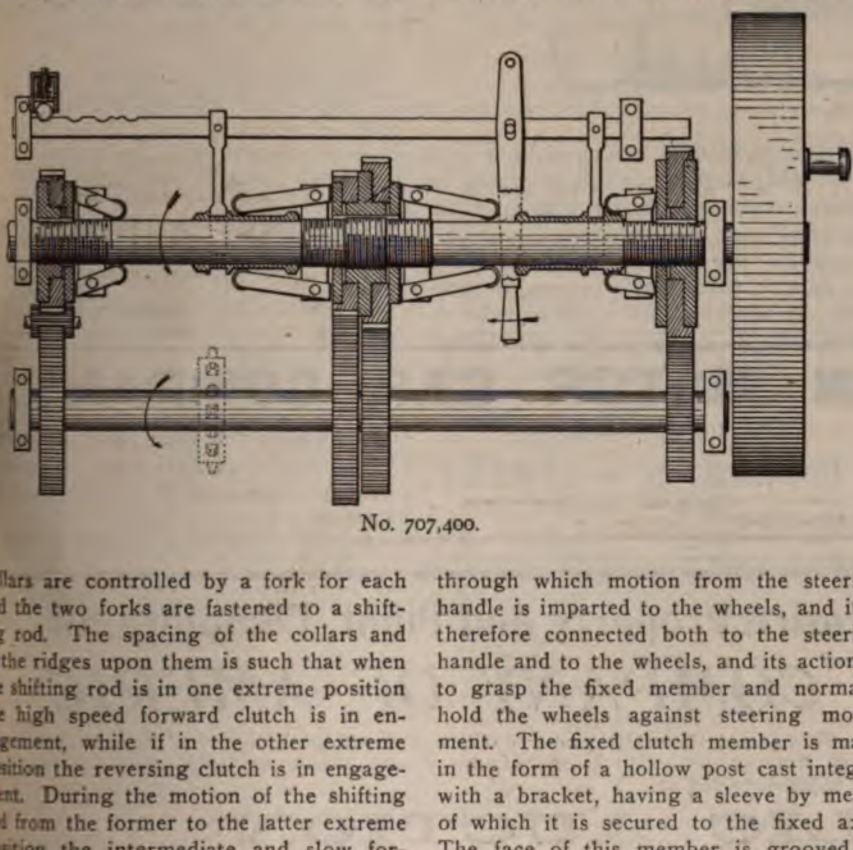
a series of flat springs fixed at intervals to the rim by means of bolts and set screws. At the upper portion the springs are curved and provided with ears for the reception of the bolts and nuts fixing the springs to the india rubber tire. For heavy loads the number of these springs may be increased. The springs may be arranged in the same manner as those employed for the flat suspension springs of vehicles, with or without the interposition

between them of india rubber filling members. In order to increase the strength of the whole without prejudicially affecting the elasticity, there is arranged at the centre of the tire for each set of springs a ring connected by means of rods to the outer springs. India rubber members are prepared in advance, so that they may, after the tire has been mounted, be placed between two consecutive springs. These filling members are maintained by means of hooks fixed upon the members and engaging in counterparts fixed to the springs themselves. The employment of these filling members prevents the penetration of any foreign substance within the tire.

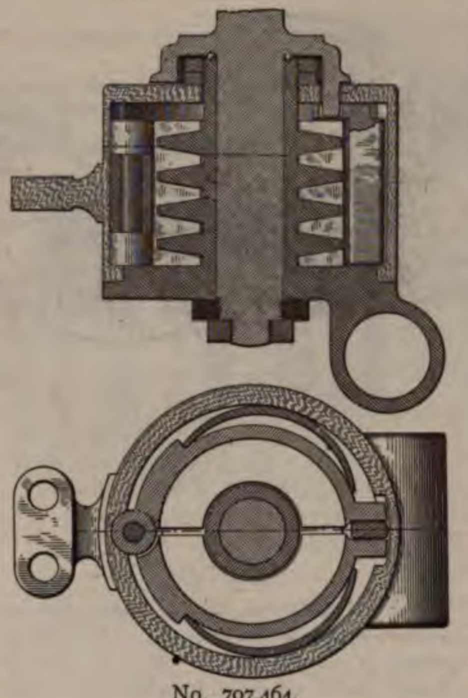
707,400. Transmission Gear for Automobiles.—George P. Dorris, of St. Louis, Mo. August 19, 1902. Filed April 4, 1901.

The transmission comprises two parallel shafts, one of which, forming the driving shaft, has loosely mounted upon it four spur pinions each provided with a friction clutch. The other shaft carries four corresponding spur gears, three for forward motion and one for the reverse. The invention relates particularly to means for operating the four friction clutches successively by a single lever.

For the operation of the clutches two grooved collars, each with two ridges upon it, are provided on the clutch shaft. The collars are controlled by a fork for each and the two forks are fastened to a shifting rod. The spacing of the collars and of the ridges upon them is such that when the shifting rod is in one extreme position the high speed forward clutch is in engagement, while if in the other extreme position the reversing clutch is in engagement. During the motion of the shifting rod from the former to the latter extreme position the intermediate and slow forward speeds are engaged successively.


No. 707,400.

707,435. Steering Gear for Automobiles.—John G. McPherson, of Philadelphia, Pa. August 19, 1902. Filed October 26, 1901.


No. 707,464.

707,464. Locking Device for Vehicle Steering Mechanism.—C. S. Van Wagoner, of Cleveland, Ohio. August 19, 1902. Filed September 6, 1901.

The locking device embodies a friction clutch, one member of which is rigidly secured to the axle. The other or movable member of the clutch forms the medium through which motion from the steering handle is imparted to the wheels, and it is therefore connected both to the steering handle and to the wheels, and its action is to grasp the fixed member and normally hold the wheels against steering movement. The fixed clutch member is made in the form of a hollow post cast integral with a bracket, having a sleeve by means of which it is secured to the fixed axle. The face of this member is grooved to form annular wedge shaped projections, which enter corresponding grooves in the face of the movable or rotatable member, the object being to increase the frictional contact and effect a wedging action between the clutch members, and thus secure a firmer hold. The movable clutch member surrounds the fixed member, and it is made in two sections, hinged together and enclosed within an annular case, supported on an annular bearing formed around the edge of the bracket, and also by the upper end of the fixed clutch member, which projects through the top of the case. The interior wall of the case is provided with a groove to afford a seat for the knuckle of the hinged clutch sections, the hinged sections and the inclosing case being thus coupled to move or rotate together. The free ends of the clutch sections are provided with projections between which is inserted a flat bar or rocking lever, which when turned on its longitudinal axis will thrust the clutch sections apart and release them from engagement with the fixed member. The projections extend into a recess in the wall of the case, so that when the clutch members are separated by the rocking lever the lugs will engage the edges of the recess and thus afford an additional lock between the clutch sections and the case. The clutch sections are normally held in locking engagement with the fixed clutch member by strong metal springs inserted between the sections and the enclosing case.

In the operation of the device the initial movement of the steering shaft causes the finger to turn the rocking lever for separating the clutch sections and releasing them from locking engagement with the fixed clutch member. The finger thereafter comes in contact with the end of the slot in the case, and the case is moved thereby for changing the position of the steering wheels.

707,079. Feed Pump and Connection for Horseless Carriages.—John C. Blevney, of Newark, N. J. August 19, 1902. Filed January 8, 1901.

The object of this invention is to enable the driver of a vehicle driven by steam to regulate more effectively and conveniently the supply of water within the boiler. The invention consists in the combination with the engine, boiler and pump of a fixed fulcrum, a sectional lever, one of the sections of which provides the bearings for the fulcrum of said lever, and the other section of which is connected to the piston of said pump and the piston of the engine, and means for changing the relation of the said sections to increase or diminish the length of stroke of the pump.

707,169. Spring Tire for Vehicle Wheels.—Henry C. Shearman, Providence, R. I. August 19, 1902. Filed August 5, 1896.

707,230. Automobile.—John C. Henry, Denver, Col. August 19, 1902. Filed April 1, 1901.

707,340. Running Gear for Automobiles.—Albert A. Medina, East San José, Cal. August 19, 1902. Filed June 10, 1902.

707,206. Body for Motor Vehicles.—Ferdinand Charron and Leonce Girardot, of Paris, France. August 19, 1902. Filed April 22, 1902.

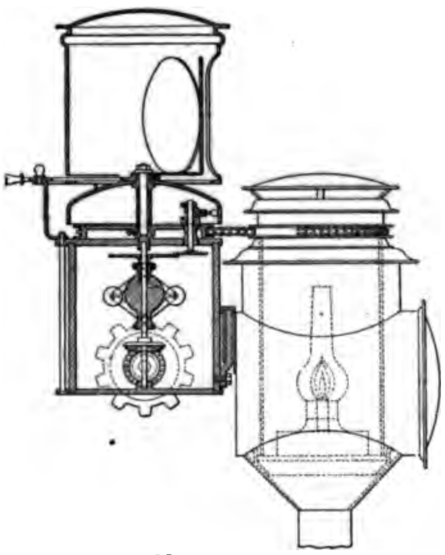
The essential feature of the improved

body is that the entrance is at the side and that the opening of the door produces the automatic lifting of one of the front seats or driver's seats, so as to leave a large free passage to the person who mounts on the carriage without it being necessary to augment the length of the carriage.

707,254. Apparatus for Indicating When Certain Predetermined Speeds Are Exceeded by Vehicles.—A. F. Poillevillain, of Paris, France. August 19, 1902. Filed May 10, 1901.

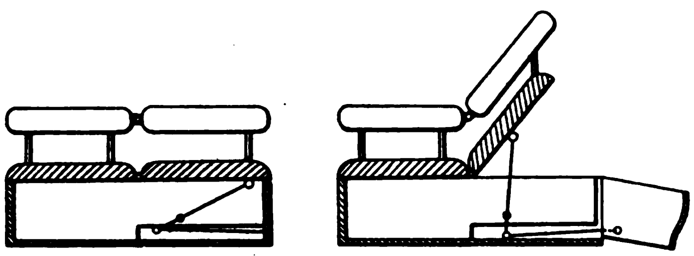
The invention relates to a speed indicating apparatus which may be varied or adjusted to indicate the limit of speed at which the vehicle is to travel and which is combined with automatically controlled means for indicating when the limit of speed is exceeded.

Referring to the drawing, the instrument comprises a centrifugal governor, the shaft of which is rotated by means of mitre gearing and a sprocket pinion, which is connected by a chain to some rotating part of the vehicle. The weight of the governor supports a disk by means of rods or pins, so that said disk not only rotates with the weight but is also elevated and depressed as the weight moves up or down on its shaft. A case incloses the governor and its accessories and serves also as a support for a lantern.



No. 707,254.

Within the frame of the lantern is mounted a tubular frame, encircling the flame of the lantern, and this frame carries three panels of different colored glass—for instance, white, green and red. The tubular frame is secured at its top in a ring or crown, partly encircled by a sprocket chain. The chain also partly encircles a second ring or crown keyed to a sleeve. This sleeve is adapted to be turned by a hand lever, and when so turned transmits its movement through the chain to the tubular frame so as to bring any one panel between the flame and the lens of the lantern to show a color—white, green or red—from the lantern. In the drawings the intermediate color panel, which is gr shown, and this indicates the intern speed of the vehicle for, say, rural ties. The white panel when turned erative position indicates the lowest of the vehicle for, say, city localities, as the red panel when displayed frc lantern indicates topmost speed. Th positions of the hand lever are secu locking the hand lever to three poi a sector by means of a pin. The turns about a fixed rod or shaft, and sleeve is fixed a gong.



No. 707,206.

In the ring on the sleeve referre formed an annular slot to give pass a sleeve fixed in the roof of the casi this sleeve is adapted to rotate a s carrying at its base within the ca friction disk. The spindle also e upward within the gong and carries near its upper end a hammer lever, when the spindle rotates is adapt strike the gong to give an audible On the top of the ring is fixed an or cam which is slotted in alignmen the slot in the ring. Now when the rotated by means of the hand lev spindle will be elevated or dep through the cam and the disk at the end of the spindle is moved away fr brought nearer to the disk operated governor. Now the lower the disk end of the spindle the less speed required to cause the rotating go disk to come in frictional engagemen the disk on the spindle and thereby the gong to strike.

The hand lever can be set in any three positions and the lantern will the corresponding light. If the spee corresponding to this light is exceed gong will strike.

BUSINESS AUTOMOBI

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ISSUE OF FEBRUARY 6, 1901.

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Devoted to Motor Interests

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The Contest Rules.

In reading the rules of the 500 mile reliability run of the A. C. A. one receives the impression that many defects found in the rules of former contests have been eliminated here, and that details have been worked out with much greater care than formerly. It is especially gratifying to note that a method of assigning observers has been worked out which bids fair to avoid the confusion and disappointment which accompanied this feature in the several 100 mile contests held this year.

Another new feature is the provision allowing steam carriages to renew supplies anywhere along the route without being penalized, but limiting the time which may be occupied for this purpose in each stage to twenty minutes. How this rule will suit the steam interests remains to be seen. To us it appears quite liberal.

The rule prohibiting the replacement of wheels, engines, boilers, etc., will be generally approved of we believe, since otherwise the contest might in some cases depend too much upon the financial resources of the competitor, a fault that was generally ascribed to last year's contest. And the accompanying test of tires should certainly also prove a valuable feature.

While so far the rules appear very satisfactory we cannot say that the system of making awards meets our ideals. The contest is called a reliability contest, yet the only factor determining the awards is speed. All that is required to earn a first class certificate is to make a total average speed of 12 to 15 miles an hour. It is, therefore, not at all certain that in case a vehicle should make the run absolutely without penalized stops it would get a first class certificate, if it be of the light and low powered class. It appears that to get the full number of marks for reliability is not at all possible without violating the speed laws of the two States in which the greater part of the contest route lies, for that requires an average speed of 15 miles an hour, and since in towns the speed must be reduced to 8 miles an hour, and 15 is the highest in the country, it is, of course, impossible to make a total average of 15 miles without breaking the law. Probably this is the reason that nothing is said in the rules about operators being required to conform to the laws of the several States, and that the speed rules are couched in rather indefinite terms. If our interpretation of this rule is correct the regulations directly invite disregard of the State laws, which seems rather strange in view of the former policy of the club.

It appears to us that the marking for reliability should be entirely independent of speed, and that the reliability marks earned should have at least as much influence upon the awards as the speed.

An Example of Liberal Speed Legislation.

As has already been briefly reported in our columns, the board of trustees of the village of South Orange, N. J., has had under consideration for some time past the passing of an ordinance to regulate automobile traffic on its streets. The Oranges, as is generally known, are the home of many business men having their place of business in New York, and as the population is comparatively wealthy many automobiles are owned there. A considerable number of automobilists are, therefore, affected by these regulations.

The ordinance originally introduced, which reached its third reading, provided a speed limit of 10 miles an hour. This limit was considered rather restrictive by the automobilists, as the streets of the village are comparatively free from traffic, and accordingly Mr. Adams, of the Adams-McMurtry Company, who resides at South Orange, gave the trustees an opportunity to acquaint themselves by experience with the various factors affecting the safety of automobile traffic, by taking them out in his machine, and drafted an ordinance raising the speed limit to 15 miles an hour, which has just been adopted. The most important provisions of this ordinance are as follows:

"No motor vehicle shall be run on any of the public highways or places within the limits of the village of South Orange at a rate of speed which shall endanger the life, person or property of anyone using said

highways or places, or at a rate of speed which is unreasonable, due regard being had to the use by others of said highways and places and of intersecting or connecting highways, but in no event shall any such motor vehicle be run at greater rate of speed than 15 miles an hour, except to avoid accidents.

"Every person having control or charge of a motor vehicle shall, whenever upon any of such public highways or places and approaching any vehicle drawn by a horse or horses, or any horse upon which any person is riding, operate, manage and control such motor vehicle in such manner as to exercise every reasonable precaution to prevent the frightening of any such horse or horses, and to insure the safety and protection of any person riding or driving the same, and if any such horse appears to be frightened, the person in control of such motor vehicle shall reduce its speed, and if requested by signal or otherwise by the driver or rider of such horses or horse shall stop such motor vehicle, unless movement be necessary to avoid accident or injury, until such horse appears to be under the control of its rider or driver."

These provisions must certainly be called liberal, and as automobile legislation is more or less tentative at the present time, considerable attention will undoubtedly be paid to the working of the South Orange ordinance by neighboring municipalities. It is to be earnestly hoped that the Orange automobilists will appreciate the freedom accorded them by their village trustees, and will do their utmost to keep within the bounds prescribed by the ordinance. The terms of this ordinance are such as we eventually hope to see in force in all country towns, and the success of this ordinance will hasten the removal of oppressive and unreasonable speed restrictions.

"Taking Their Choice."

Commenting upon our recent strictures on record breaking tours the *Car*, an English publication, says:

"All these arguments seem strange enough from an automobile journal, and it would seem that the difference between the motor car and a traction engine is not as yet clearly understood by those who set themselves up as authorities upon speed limits in the United States. In the meantime all these vain protests against the purchase of superior makes of cars appear to have little effect. The wealthy American knows the difference between a good car and an inferior one, and accordingly we find them purchasing from Europe all the fast machines whose merits have been tested the moment they are upon the market. Therefore, these protests about the purchase of fast and well made cars seem to be like 'the voice of someone crying in the wilderness.' Automobilists in all countries prefer a fast car to a slow one, and while they provide the money they have, they believe, the right to take their choice."

We really did not intend our remarks for tours made in foreign built vehicles particularly, but the comments of our contemporary intimating this are of some interest in the light of several recent occurrences, and particularly as having appeared in print the day before the Fair accident. We fail to see clearly the connection between a "fast" and a "good" machine, and the justification for using these terms interchangeably as does our contemporary. A very fast machine which stands up for any length of time must necessarily be well made, but that does not yet make it a "good car" from the standpoint of the average automobilist. A good car is not necessarily characterized by speed. What the majority of the people want is a car that is safe, reliable, durable and inexpensive in operation. Among those possessed with the speed madness there are, of course, quite a few to whom cost is no consideration, but their penchant for speed will have no effect on the ultimate course of the automobile industry, because they are comparatively too few, and also too fickle in their devotion to the automobile. The following two Paris dispatches, while not proving the last assertion, at least indicate its correctness:

"Mr. B—— M——, Jr., recently made a trip from London to Paris by motor car in exactly six hours, beating the best railway service by over one hour, although he lost fifteen minutes through an unexpected change in the steamer time table."

"Mr. B—— M——, Jr., has decided to sell his automobiles. The Fair accident recently and the fact that he has been particularly unlucky with his machines has dampened his enthusiasm for automobiles."

We have never protested against the purchase of well made cars—on the contrary, have been most emphatic in our demands for better construction—and if our protests against the abuses of the automobile's speed possibilities have been more or less a "cry in the wilderness," we still feel certain that they will have some effect, and that the speed craze will soon be effectively checked. We do not presume to dictate to anybody what kind of a car he shall buy. But recent occurrences show that racing machines are not adapted for touring upon country road, and if some of those "wealthy Americans * * * purchasing from Europe all the fast machines" had bought somewhat slower American ones they might have done better for their own good and for that of the industry both here and in Europe.

A New Industry.

Recently the report went through the press that the first automobile body in this country built entirely of aluminum had just been completed. Considering the extent to which aluminum bodies are used abroad it is rather remarkable that their manufacture should have been delayed so long in this country, but it is gratifying at least that now we are no longer dependent upon France for such bodies. In many new lines of manufacture a demand has to be created for the manufactured goods, but in the case of aluminum bodies the demand preceded the supply. Only a few months ago an order for twenty-five bodies went abroad simply because the order could not be filled here at the time.

The aluminum body, compared to the wood body, has the advantages of non-inflammability, lightness and durability, and aluminum is certain to find a large place in the construction of automobile bodies in the future. The objection so often made to metallic bodies that they give out a ringing metallic sound on the road does not seem to apply to aluminum bodies, and the only possible disadvantage of these bodies can be the slightly higher cost, which is, however, more than balanced by their various advantages.

The widely advertised world girdling trip in the "Passe Partout" seems to have been definitely abandoned, for not a word has appeared about it in the press for several months. When last heard from the expedition was somewhere in the Rhine country, and it is possible that it occurred to them that worse countries than that were ahead of them, and they decided to build their homes there. Under these conditions a relief expedition is hardly called for.

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Comment on A. C. A. Contest Rules.

By Albert L. Clough.

With each endurance contest which is held comes a better understanding of the conditions which should govern such events, and of the abuses to which they may be susceptible, and with the aid of the experience obtained new and better rules may be formulated.

The regulations which are to govern the A. C. A. 500 mile reliability test furnish strong evidence of this, and are evidently the mature result of a very great amount of well directed thought on the part of the association's committee. No previous contest in this country has been run under such full and well considered rules. They appear to be framed in a spirit of perfect fairness, and evidently aim to reproduce, in a formal contest, as nearly as possible, the actual conditions which would confront the ordinary automobile tourist in making a trip of this length.

The most important merit of this contest lies in the fact that it is to take place over ordinary roads, and not over the boulevards of an exceptionally improved section, as Long Island. The roads encountered will represent a great variety of conditions, both as regards grade and surface, and in general will be found to be of about the same character as those likely to be met with in other parts of Eastern United States. A test of 100 miles, while sufficiently long to develop many weaknesses in adjustment of parts and some deeper lying defects, is not sufficient to demonstrate instances of excessive depreciation of parts and fundamental errors of method and structure. A 500 mile test over ordinary roads ought to be protracted enough to "tell the story" as to the probable "staying power" of a vehicle in practical use.

The New York-Buffalo test proved long enough for this purpose, but all reliable results were sacrificed, owing to the absence of official observers and the failure to restrict repairs.

The forthcoming test would seem to combine the good qualities of all the tests which have preceded it. It has the length and the hard roads of the Buffalo run, and at the same time provides for full official surveillance of each machine, as in later contests, and restricts the repairs to those which an ordinary tourist could perform in practice. One may say that the system of official observers is now a firmly established practice, and it is not easy to see how it could be improved.

In the Decoration Day test the entering vehicles were required to be described in respect to the cylinder dimensions and normal speed of their motors, but it is noted with regret that this information is not demanded by the present regulations. It must be apparent to all that this information, as well as future data on ratio of engine turns to driving wheel turns on the respective gears, must be forthcoming before full technical conclusions can ever be drawn as to the relative value of different engine designs and transmission systems.

It is to be assumed that the A. C. A., finding that it was unable to get engine dimensions from the manufacturers in the May 30 test, has cut this requirement out from necessity and not from choice. At any rate its omission is greatly to be deplored by all who are technically interested, but one need not despair that in time the manufacturers as a class will realize that the zealous withholding of this all important data is being construed by the public (as it rightly should be) as strong evidence of charlatanism on the builders' part. When this time comes the holy mystery inside the water jacket will be divested of its occult character and become a straightforward and legitimate mechanical proposition.

A classification of the vehicles by weight is adhered to in the present contest, and is probably the only practical method at hand, although it is well known that a classification based upon the "ability" of the vehicles is the only method that is theoretically just. As has been pointed out in the past, the expected performance of vehicles, similarly geared, must be based upon the relation of power and weight, but as the data from which the expected horse power has to be obtained is, as remarked above, unobtainable, it is impossible to figure the "ability" of any of the vehicles and to classify them thereby.

The usual courtesies are extended to the electrical vehicles by the framing of rules governing battery charging, etc., in case they should come in.

The most noteworthy innovation to be found among these regulations is the restriction of repairs to the noon control and a prescribed period in the morning of each day under the surveillance of the official observer and the prohibition of the replacement of any parts other than those which can be carried upon the vehicle—the work to be entirely performed by the crew of the vehicle and local machinists, and not by factory experts forwarded to control points by train. To all who witnessed the Buffalo test and saw the repair wagons operated by certain much advertised concerns, manned by mechanics from the factory and loaded with everything necessary to create a new automobile around the old name plate, and saw the strenuous burning of midnight oil in the garage, this reform must appeal as a most excellent one.

There seems to be no provision made for an inspection of each vehicle by its official observer or other responsible party at the conclusion of the test. This omission may be regretted, although there may be some good reason against its adoption. The public in much interested in the question of depreciation as it is in that of reliability, and it would seem equally important to place upon record the repairs which are necessary at the close of the test to put the machine in perfect order as it is to keep account of the repairs on the road. If the condition of all parts of the vehicle at the finish could be reported upon, the result would prove very instructive. It is conceivable that a machine might be so flimsily constructed, with such poor bearings, that this test might virtually wear it out, and yet it might go through with no stops and make the maximum speed, and on the other hand a machine might be so well built as to show hardly any signs of the 500 miles usage, and yet by minor difficulties be deprived of a certificate. However, this is to be a "reliability" test and not a depreciation test, and yet the depreciation of today accounts for the unreliability of tomorrow.

In past tests much disappointment has been occasioned to persons, some of whom came long distances, to act as official observers, by the non-appearance of the vehicle to which they had been assigned. This difficulty seems to have been fully provided against in the present rules.

Much confusion has been occasioned in previous contests by the removal or concealment of the official number which each vehicle carries, and the present rules take cognizance of this matter. The relief of mufflers is also prohibited vehemently, but it is not explicitly stated that this action shall result in disqualification. If disqualification is to really mean an *entire* lack of "mention in the official records" it may have some effect in correcting the high speed nuisance, but of course no power on earth can prevent the yellow press from making copy out of "devils" and "ghosts" of assorted colors that choose to break speed rules for advertising purposes.

It is extremely gratifying to note the provision in regard to tires, which calls for full data in regard to the tires used upon each competing vehicle, and furthermore provides for a full record of all repairs which they require. This is a very frank recognition of the surpassing importance of the tire question, and the results obtained will be awaited with the greatest interest. If the apparent condition of the tires at the finish could be fully reported upon, the inquiry would have an even greater value.

The chief of the cyclist detachment of the Paris police makes his rounds on a motor bicycle.

An automobile volunteer corps is to become permanently attached to the British Army. The corps will be composed of officers only.

In the forthcoming production of "Naughty Nancy," at the Savoy Theatre, London, Miss Loftus will drive a motor car on the stage.

Two new automobile clubs have recently been organized in Germany, the Brunswick Automobile Club (Hotel Petersburg, Brunswick), and Automobilverein der Mark Brandenburg (Hotel Kaiserhof, Berlin).

Some Notes on Journal Friction.

By [illegible]

While designing the machinery of a [illegible] some time since the writer was concerned with the problem of whether [illegible] bearings for the main axle and engine [illegible] with white metal.

The question was not only one of minimum friction, but it was thought that the white metal bearing [illegible] would be much cheaper to make.

It was also desired to ascertain what would be the difference in friction between these bearing surfaces when lubricated with a good grease [illegible] a Stauffer lubricator [illegible] of the same bearings lubricated with oil.

On commencing work [illegible] the writer was told on the one hand that white metal was used in marine bearings more with a view to preventing serious breakdowns, in the event of a hot bearing, by allowing the white metal to melt out and let the shaft down on the bronze backing, than to considerably reduce friction; and on the other hand that white metal made a large difference in the friction of the journal.

The truth probably lies between these views, and Professor Goodman told the writer that though white metal made a large difference when badly lubricated or when under very heavy loads, there would probably be little or no difference in the friction of lightly loaded and flooded surfaces. This opinion it may be stated was borne out by the present experiments with oil bath, but not for grease.

The first experiments were conducted with a bronze bush bored out and fitted with a small spring Stauffer lubricator of rather inferior construction, the stem of which was pressed from time to time to insure the supply of grease being good. The apparatus consisted of a 1¾ inch shaft driven from the shop line shaft and running in bronze bearings kept cool by water, while the test bearing was on the overhanging end, and was loaded from below by a lever, the total weight being about 500 pounds. The length of the test bearing was 4 inches, giving 7 square inches of bearing surface and a pressure of only about 70 pounds per square inch.

One interesting fact is that the bearings in which the shaft ran had to be kept cool with water, in spite of very good lubrication, or they seized at once, while the rise in temperature of the test bearing not artificially cooled was not much above 20° or 30° above atmosphere. This is attributed to the inner bearings being a little out of line, and emphasizes (if emphasis is necessary) the importance of careful alignment in bearings, even for low pressure.

This point of correct alignment is one reason for using white metal, as when it is poured around the shaft in position it is very difficult to get the bearings anyth[illegible] but true. In addition to this t[illegible] if the metal is correctly poured, are very good indeed.

The bronze bearing was prepared in the ordinary way by boring in the lathe. On the under side was a pin projecting into the wooden lever used for loading the bearing, with a view to preventing it from turning round, and on the upper side was a tapped hole for the lubricator and a small piece of copper tube fitted also a hole not quite bored through and filled with mercury to take the stem of a thermometer.

The friction was judged from the thermometer readings alone.

In an article in a contemporary some time since Professor Goodman stated that this method of judging friction of journals was very misleading, as the temperature not only depended on the friction but also on the rate of radiation, and this latter varied greatly with the moisture of the atmosphere.

However, as the present experiments were conducted in about ten days of uniformly hot summer weather, it is not probable that any very large errors are to be feared in the results.

Curve No. 1 gives the results of the grease test. The grease used was the Mica Grease Company's patent grease, which appears to be an anti-friction grease of good quality, into which is incorporated a quantity of powdered mica, and the whole scented with an essential oil.

Fig. 1 will require very little explanation. As shown, the mica grease was kept going till the bearing had remained for some time at one temperature.

Toward the end of the experiment a little lard oil was added at the point marked (a) to the bearing, which lowered the temperature 1½°, but it at once rose again, so the experiment was stopped.

OIL BATH.

The arrangements for this were as follows: A small piece of ½ inch gas pipe was screwed to the place where the spring lubricator had been, and a tin dish was arranged under the bearing. The oil was then poured into the top of the one-half inch tube, which acted as a reservoir, and was caught as it ran out of the bearing and poured back again. No doubt this is a little in favor of the oil, as this constant circulation tends to keep the bearing cool and thus gives results unduly favorable to oil. As, however, only about a wine glassful of oil was in use the discrepancy will not be large.

After lard oil had been used for some time Price's Grosvenor oil was tried. This is not a fair trial of this oil, as it is intended for very heavy loads, being Grade No. 00, with a very high viscosity as given below, and sold for heavy marine engines. The experiment is useful as showing the bad effect of using an oil of too high a viscosity. This was followed by lard oil, and that again by (Curve 6-7) Price's ordinary gas engine oil, which comes out about the best of the oils tried. This was [illegible] by lard oil again (7-8), and the end of the curve (8-9) is a mixture o[illegible] troleum.

Fig. 1, Curve 3, gives the results, [illegible] it will be noticed that the temperatu[illegible] the bearing fell off rapidly and conti[illegible] to fall to the end of the experiment.

The above experiment was pract[illegible] continuous with the grease trial, onl[illegible] minutes intervening between one an[illegible] other, and the bearing being still ho[illegible]

Experiment No. 4 commenced w[illegible] cold bearing and the result is giv[illegible] Curve No. 4.

The scheme of the experiment w[illegible] use lard oil as a standard of comp[illegible] for several oils. For this reason la[illegible] was used between every two oils as [illegible] Thus, suppose lard oil had been in us[illegible] the bearing temperature had settled [illegible] to a constant and that then anoth[illegible] was substituted, resulting in a ri[illegible] temperature. Then after this oil ha[illegible] in use for a short time lard oil [illegible] again be added, when if the rise i[illegible] perature was really due to increase[illegible] tion the temperature might be expe[illegible] fall on the reintroduction of lard oi[illegible] as a fact this was always the case. [illegible] way lard oil is sandwiched in b[illegible] every pair of oils.

At the end of this experiment a m[illegible] of petroleum oil and Price's gas eng[illegible] was tried, it being thought that p[illegible] the load was so light that an oil wit[illegible] small viscosity would do, but the b[illegible] almost immediately overheated.

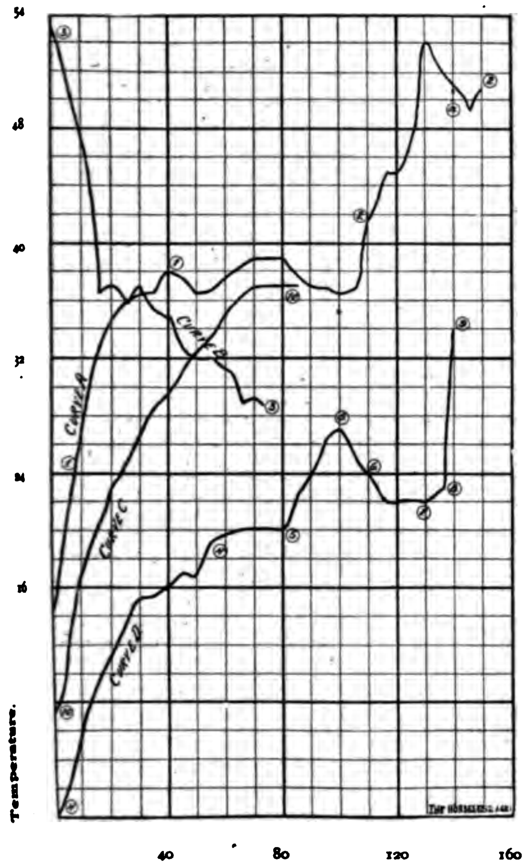
The readings were taken in all c[illegible] five minute intervals and the tempe[illegible] are in degrees Fahrenheit.

At the end of the last experime[illegible] scribed and before the magnolia [illegible] bearing was fitted, it was decided [illegible] the mica grease again, as it was t[illegible] that possibly the bearing might be [illegible] ter order. Curve No. 10 gives the [illegible] which are practically identical with [illegible] of Curve No. 1.

The results of these experiments [illegible] that there is some advantage in [illegible] bath over grease, as might be ex[illegible] but as pointed out, the oil bath [illegible] slightly unfair advantage, and in a[illegible] it is a very unusually perfect form [illegible] brication and it is very probable t[illegible] grease lubrication would show be[illegible] sults than either pad or syphon [illegible] tion.

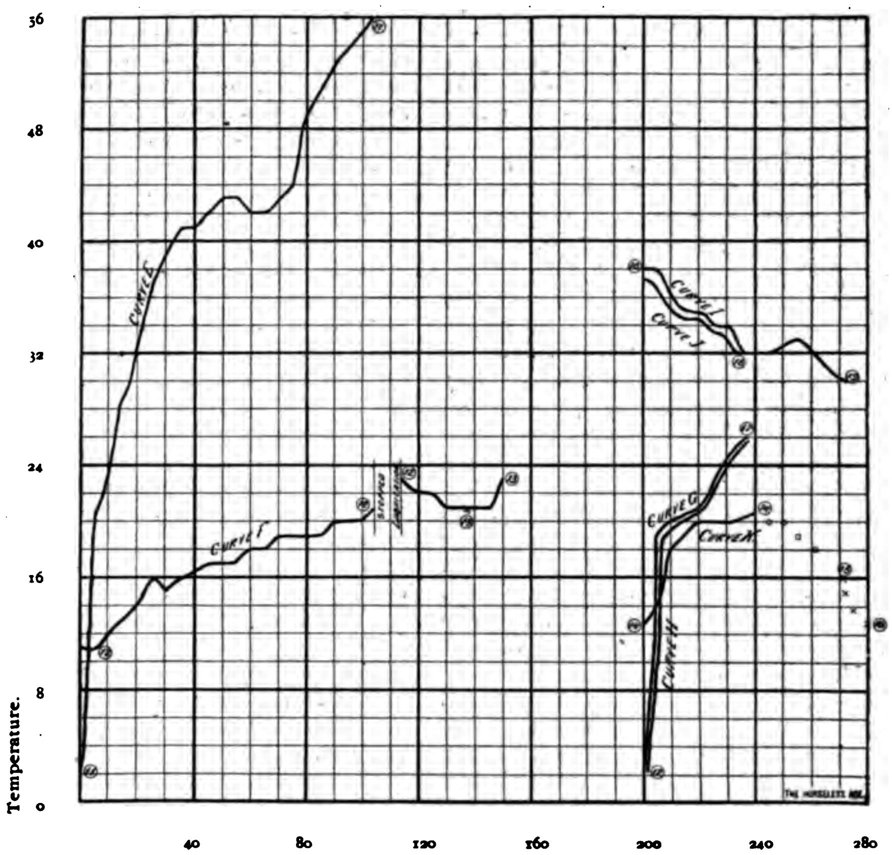
The writer was somewhat surp[illegible] the good showing made by the gas [illegible] oil, as compared with lard oil, and [illegible] this good showing which suggest[illegible] idea of trying such an oil as the [illegible] cylinder oil for journal purpos[illegible] which, of course, it was never in[illegible] the idea being that possibly one oi[illegible] be found for all purposes. Howev[illegible] giving the matter careful consider[illegible] was decided to use a charcoal [illegible] cylinder oil which would not do [illegible] journal lubrication, as it would b[illegible] solid at ordinary temperatures.

A glance at Molesworth's me[illegible]



Time. (Brass Bush.)

Fig. 1.



Time. (Magnolia Bush.)

Figs. 2 and 3.

pocket book will show that for bath lubrication he gives lard oil as one of the worst lubricants for light weights (of the oils he mentions), sperm being the best. This oil was never tried, but doubtless it would come out better than lard or gas engine oil. It may be added that this gas engine oil is a compound of hydrocarbon and a little well selected neutral animal oil.

MAGNOLIA METAL.

The bearing was prepared by setting the shaft on end and placing a 4 inch length of gas pipe round it and pouring this full of the magnolia. The outside of the gas pipe was then tapped with a hammer to loosen the bearing and the shell was drilled to take the same fittings as in the case of the brass bearing. The size (outside) and weight were about the same as the brass bearing.

Perhaps it will not be out of place at this point to give a few hints drawn from the writer's experience on the pouring of white metal bearings in general. First as to the quality of the former. The writer is informed by a first class authority that common lead makes about as good a white metal bearing as can be had, and the same authority recommends the surrounding of the shaft with tissue paper before pouring. The writer did not find this to work well, and proceeded as follows:

The shaft to be bushed was arranged in position and the bearing shell adjusted after having been previously tinned, so as to make the white metal stick to it. If for any reason tinning was objectionable, two or three holes could be bored in the shell to make the white metal hold.

Having got the bearing ready for pouring, all the interstices are to be filled with a good clay. Sifted Stourbridge fire clay answers well and care must be taken that the clay does not flake off in the drying. The flame of a foot blow pipe was now directed into one side of the bearing where the metal was to be poured and allowed to come out of a hole left for the purpose on the other side. When the shaft would readily melt solder the white metal was poured. If the shaft is not previously heated it is necessary to overheat the white metal to a dangerous extent in order to insure a good surface and to prevent folds in the metal. On the other hand, when the shaft has been heated to the melting point of the metal the clay fillings have to be very good or the metal will find its way out, as it remains melted for some time in the bearing, while with a cold shaft it sets instantly. The makers of Magnolia metal recommend that the metal be heated till it will char a pine stick, and this seems good practice and to cause comparatively little waste.

MICA GREASE AND MAGNOLIA.

As will be seen from Fig. 2, this did not work at all well, the temperature rising with great rapidity and was still rising when the experiment was stopped. On examining the bearing it was found that spots had become dry in spite of the grease being carefully fed, both by the spring of the lubricator and by pressing the spindle of the feeder.

MAGNOLIA METAL AND PRICE'S GAS ENGINE OIL.

It will be seen on reference to Curve No. 12 that the results are slightly better than those obtained with the same oil and brass. As soon as the temperature appeared to settle down the lubrication was stopped till the bearing had become several degrees hotter and then started again. This was done to show whether the temperature had really risen as high as it was going, in which case, it was thought, if the bearing was allowed to get hot the restarting of lubrication would result in a fall of temperature. This was actually the case, the temperature falling to about two degrees above what it had been before the lubrication was stopped. Obviously it might be expected to take a long time for the temperature, when falling, to settle to the same point as that to which it rose when ascending, and it was not considered necessary to wait for that.

Before stopping the experiment lard oil was substituted for the gas engine oil and resulted in a rise in temperature (Curve 13). After stopping the feed the rate of cooling was noted with a view to giving a rough guide to the loss of heat units, and, consequently, the actual friction. The rate of cooling was three degrees in eight and one-half minutes.

To get a little further information on the matter of this radiation, the rate of cooling of a tin vessel, painted black with

lamp black and water and containing ¾ pound of water at the same temperature of the bearing was tried, the vessel being of the same size as the bearing. The cooling was at the rate of about one degree in two minutes.

If the question of oil bath lubrication be looked up in Molesworth's pocket-book it will be found that he says that the friction at pressures between 100 and 500 pounds per square inch does not depend on the load, but on the surface area in contact. That is to say, that within these limits the friction will be reduced by reducing the size of the bearing. In order to see if this would be confirmed by this set of experiments the Magnolia metal was bored out at each end of the test bearing, but not to such an extent as to make any appreciable difference to the weight, and by this means the length of the bearing was reduced to 2 inches, or by 50 per cent.

The result is given in Curve No. 14, from which it will be seen that the temperature is absolutely the same as with the 4 inch bush.

To give a further demonstration all weight was taken off the bearing, when the rate of cooling (Curves 14 and 15) was practically the same as when the apparatus was stopped (Curves 15 and 16). It would therefore seem that this dependence of friction on area is not true at pressures below 100 pounds per square inch.

The last experiment was with the same bearing lubricated with Price's Albion oil (Curve No. 17). This is a distilled hydrocarbon, only recommended for the cylinders of small engines. The result was not very conclusive, but it appeared as if this oil would give worse results than gas engine oil. At the end of experiment No. 18 the bearing nearest to the test bearing was found to be hot, which may have affected the results.

Curve No. 18 is also Price's Albion oil, but the bearing was artificially warmed up to begin with in order to ascertain what was the highest point to which this oil would permit the bearing to rise. As will be seen, the temperature fell off steadily, so that comparing results with Curve No. 17 the difference of temperature might be expected to be about 27° Fahr., as compared with 20° for gas engine oil. The end of this curve, marked No. 19, is gas engine oil, again showing a fall in temperature. The peak of this curve is due to the hot earing near by, alluded to above. After stopping the bearing cooled two degrees in three and one-half minutes.

It appears from these experiments that while there is no great advantage in using Magnolia metal over brass in point of friction, still there is an advantage, and if to this be added the great convenience of being able to cast the metal in place and thus save boring it will be found that there are strong reasons for using a white metal bearing. Further, it should be remembered that in the case of the test bearing precautions were taken that it could not g of line. These consisted in loading it more or less on a knife edge so that equal loading was certain. The advantage therefore of the certainty of alignment does not appear in these tests at all, and this advantage would be almost certain to outweigh all the others.

The actual friction can only be roughly estimated from the rate of cooling, but the figures arrived at may be of interest. The speed was 150 revolutions per minute.

The bearing and piece of shaft in it weighed about 7 pounds, and the specific heat of this metal would be about .13, so that roughly this bearing would lose one unit of heat for each degree Fahrenheit lost in temperature, and taking one unit as equal to 780 foot pounds we find that the bearing lost about two-fifths of a unit of heat per minute, or roughly 300 foot-pounds.

The surface speed of the bearing was 78 feet per minute, and at this speed a drag on the surface of the metal equal to 3.9 pounds would be necesary in order to give 300 foot-pounds per minute, and 3.9 is .81 per cent. of 480, so that the friction under these conditions seems to be between .7 and 1 per cent.

The loss of heat of the small tin of water of the same shape and temperature as the bearing was at a slightly higher rate than that of the bearing. This might be expected, as the water was kept stirred, and consequently heat would probably travel through its mass more rapidly.

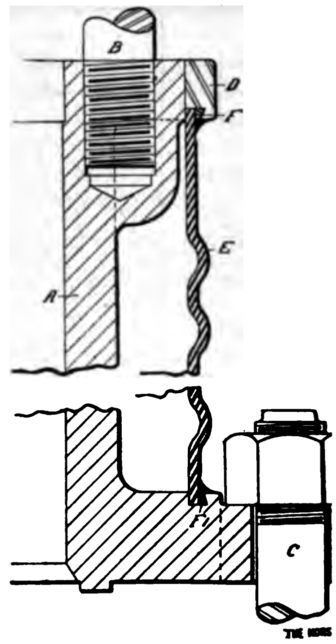
The difference is not considerable, however. The tin contained ¾ pounds of water and it lost one degree in one-half minute. Three-quarters of a unit of heat or about 580 foot-pounds were lost per minute, as compared with 300 in the first calculation. If we take a mean of these results we should obtain a friction of about 1 per cent.

The viscosities of the oils tried were as lows, Southern sperm being used as a basis of comparison at 72° Fahr.: S. sperm, 100; lard oil, 224; gas engine oil, 250; Price's Grosvenor about 1,400. This oil was, of course, in no way suited to such light work, and was only used out of curiosity to see how it would behave.

Sheet Metal Jackets of Explosive Motors.

By Hugh D. Meier.

There are at present no indications that sheet metal jackets will be used in the future to the exclusion of those cast integral with the cylinder proper. However, if it is possible to make tight joints at either end, separate jackets of copper or aluminum should prove ideal in many respects. The saving in weight is of little consequence in a pleasure or business vehicle, i. e., little is to be gained in this direction by using sheet copper or sheet aluminum jackets. In a multicylinder gasoline racing machine of high power and weight the conditions are



such that the employment of ligt jackets becomes a necessity. A p French company fitted the cyli their Paris-Vienna racing machi sheet copper water jackets. An maker equipped his engine witl cast of aluminum alloy, and for over the cylinders by hydraulic A leading American builder has sheet copper jackets from the out latter have given very good serv accompanying cut shows part of inder and its jacket in longitud tion, and illustrates the principl struction, though not the exact ployed by the manufacturer refer

In the sketch A is the cylind and C the studs by which the cyli and the frame are secured to it r ly. In the upper part of the low there is a groove turned into t which has a vertical and an inc nular wall. A ring D, with a co ing groove, is forced over the up of the cylinder. This ring may l iron, but if it is desirable to ma it must be of wrought steel. It i to screw this ring on, because c necessary additional expense o tion. E is the sheet metal jack may be made of copper or alumi less than 3-32 inch thick. To jacket it must be corrugated. T are the most interesting part, should be perfectly tight at all t not become leaky by vibration or ing of the cylinder. The best wa them tight, all methods conside to be the one in which a hea wire is used, which is forced int of the groove not occupied by and then caulked. Should a leak it can be quickly remedied wit chisel and a hammer.

There is a question in the wri as to whether solder is necessary ditional safeguard or not. Its suggest bad practice to the t

The solid black fillets (G and G') indicate the solder.

Cylinders which are to be fitted with sheet metal jackets are usually cast without a head. If the latter is integral with the cylinder the lower flange must be a separate piece and well secured. On account of their simplicity cylinders of this type are readily cast. They are generally free from blow holes, and therefore but few, if any, castings need be thrown away. It does not follow that this type of cylinder and its jacket are cheaper to manufacture than the ordinary variety. If but a small percentage of cylinders of the latter pattern prove to be worthless they will be a cheaper style to build. Without a special machine tool to produce the grooved recesses and finish the upper flange of a multicylinder engine it is impractical to surround two or more cylinders by a single jacket.

E. B. Martin's Chicago-New York Tour.

An automobile tour of something like 1,200 miles, over roads as we have them in this country, is enough of an achievement to merit some special attention, particularly when, as was the case in the trip to be described, no professional chauffeur accompanies the vehicle, and very little trouble from break downs of any kind is met with.

E. B. Martin is a business man of Chicago, residing on Michigan avenue, in that city, and the owner of a Packard touring car, which he has named the Flying Dutchman. The body of the vehicle has been remodeled by Mr. Martin; it is of the tonneau type, with exceptionally large and comfortable tonneau seats, and painted yellow. This color has proven very satisfactory, as dirt and dust show less conspicuously on it than on any other. Aside from the body the machine is the regular Packard Model F.

Mr. Martin was accompanied on his trip by his wife, a daughter, eleven years old, and his brother, S. K. Martin. His object in making the trip he explained as follows: His mother and sister are about to return from a trip to Europe, and it was his wish to drive them in the vicinity of New York in his automobile. He also intends to make the run back to Buffalo with his machine, and from there to ship it back to Chicago per lake steamer.

The trip was started upon on Saturday, August 9, at 1:30 p. m. Mr. Martin had from E. B. Shaw a copy of the route which the latter followed in his trip from New York to Chicago, a little over a year ago, which course he also intended to follow, and from Dr. Truman Martin, of the Buffalo Automobile Club, a more detailed set of maps of the route from Buffalo to this city.

A little way out of Chicago one tire punctured, and required the renewal of the inner tube, several spare inner tubes being carried along. Hammond and Chesterton were passed through the first day, and the night was spent at Laporte, Ind., at the Teegarden Hotel. On Sunday morning the trip was resumed, and breakfast was had at South Bend with the Studebakers. In the forenoon Osceola and Goshen were passed through, and when near Ligonier a body spring broke. This was repaired at that place, and dinner was also taken. It is worth noticing that Mr. Shaw a year ago also broke a spring near Ligonier. The day's run was concluded at Kendallville, Ind., and the night spent there, but the hotel accommodations were so poor that the party went on to Waterloo in the morning for their breakfast.

Three miles out of Waterloo the spring broke again, and was repaired at Butler, near the Ohio boundary line. While the tourists continued their trip from Butler to Bryan, Ohio, they were met by W. W. Morrison, an automobilist, who gave them a map of a good route from Bryan to Toledo. Five minutes after they had passed Mr. Morrison the spring again broke, and they had it fixed at Bryan.

Between Stryker and Archbold a team was met, the driver of which was overcome with fright at the appearance of the automobile. He fell out of the wagon and when last seen by the tourists was turning over in a ditch. The horses ran about the distance of a half a block and then stopped.

At Swanton the route of Mr. Morrison's map was left, and the tourists did not go to Toledo. From here on the roads were very sandy, the sand continuing to Mt. Clove, a distance of 10 or 12 miles, which had to be made on low gear. Thereafter the roads were fine, and the party arrived at Maumee in the evening, but, finding all hotels filled, they were compelled to cross the Maumee River to Perrysburg, where they stopped over night at the Exchange Hotel.

In the morning they left for Fremont. This trip led them through the oil region and proved to be of great interest. At Clyde the tourists were informed by the health officials that typhoid fever was raging in Bellevue and other towns ahead of them, and that quarantine measures were in force. They might proceed to Bellevue, but would not be allowed out of the district again. So they took a circuitous route to Norwalk via Collins and Milan, and at Wakeman got on the main road again.

Five miles out of Wakeman a spring broke again, late in the afternoon. In this vicinity the roads were quite good and the spring was tied together by a rope, as had been the custom before, and the trip continued to Cleveland, via Oberlin and Elyria, a distance of 46 miles. It got rather late that evening, but as the party had decided to stay over at Cleveland a day they decided to run on and make it that night, which they did at about 10 p. m., after a somewhat exciting experience. They had been told that the route into Cleveland was a continuous boulevard about 10 miles long and speeded along at a rather fast pace in the dark, when suddenly they struck a stretch where the road had been torn up and where there were no danger signals. The stretch was exceedingly rocky, and when the automobile struck it at high speed it began to skid badly, but a prompt and energetic application of the brake righted it. This was the only time the possibility of accident suggested itself to the tourists on the trip. This was on Tuesday night, August 12.

Wednesday the tourists stayed at Cleveland, and on Thursday morning they resumed their trip, passing successively through Painesville, Madison, Geneva, Ashtabula, Kingsville, Amboy and Conneaut. Between the latter place and New Springfield they met their first bad hill. While coming down this hill, the road surface of which was rough and stony, at a good speed, a dog was run over and killed. The trip was continued by way of Girard Junction, and at 1:30 p. m. Erie, Pa., was reached, where dinner was taken. In the afternoon the trip was continued via Fredonia and Silver Creek, and while near the latter place Mrs. Martin missed a couple of notebooks, one of which, containing data of the route, had been lent her by friends, and was therefore missed more than it would have otherwise been. So the vehicle was turned around and run back, and the books were found lying on the road about 10 miles back. The books had been in the care of the passengers in the tonneau, but they had fallen asleep—certainly a good testimonial to the comfortability of the automobile—and the books had somehow dropped out.

Buffalo was reached on Friday afternoon, and there the tourists stayed at the Lenox Hotel, the headquarters of the Buffalo Automobile Club. They were very kindly received there, and enjoyed themselves finely during their stay. The roads around Buffalo were very good. While in Buffalo a visit was paid to the Roycroft publishing establishment.

On Saturday the trip was continued over the route known as that of the New York-Buffalo Endurance Contest. The first day's run from Buffalo was completed at Rochester, and the second night was spent at Oneida. A very steep hill was encountered at Macedon on the second day. On Sunday the trip was continued to Fonda, where the party stayed over night at the American Hotel. That day's trip led them through the famous Montesuma swamps, just west of Utica, which automobilists will do well to avoid. In the afternoon, from Herkimer to Fonda, the roads were good, however.

On Tuesday morning there was a pouring rain, and the tourists stayed at Fonda till noon, when they left for Schenectady, where they arrived in the evening and stayed over night at the Nelson House. On their way to Schenectady they were

misdirected and went 5 or 6 miles out of their way, thereby losing two hours' time. Albany was reached on Tuesday at 6:30 p.m. On Wednesday at Hudson a firemen's convention parade was witnessed. The road from Albany to Hudson was good. At the latter place two hours were lost through a misplaced dust coat. The new macadam road around Nelson Hill is now completed, and the hill was thus avoided. At this place one of the tires of the machine burst and caused some delay. At Tarrytown the tourists remained for half a day owing to rain. Here they neglected locking one of the side body panels, which was lost, and so they came into New York with one panel or door missing. From Tarrytown to New York the roads were very good. The party arrived at New York at 1:30 p. m. on Friday, August 22, having been just thirteen days on the way. They are staying at the Waldorf-Astoria, and the machine was taken to the station of the Adams-McMurtry Company at 317 West Fifty-ninth street, where it was seen by a representative of The Horseless Age. The evidence of severe usage was very plain on the treads of the tires, which were deeply pitted and cracked, but otherwise the machine, which was just being washed by one of the station employees, bore no sign of deterioration from the hard work it had just accomplished.

All of the tourists were apparently in good health and not particularly fatigued after the long journey, but Mrs. Martin indirectly admitted that the daily mileage had been more than was conducive to the best enjoyment of the trip. The tour back to Buffalo, she said, would be made more slowly, and that she thought would make it more enjoyable.

Soldering Aluminum.

The difficulty of soldering aluminum has engaged a good deal of inventive talent, and, although new fluxes and new solders are constantly brought forth, the problem of an easily effected and reliable soldered aluminum joint seems to still remain unsolved. Following are some of the latest inventions in this line.

Otto Nicolai and Franz Börner, of Frankfort-on-the-Main, Germany, have produced a solder salt which may be employed either alone or in combination with a metallic solder, the melting point of which is lower than that of aluminum and its alloys. This soldering salt is formed of a mixture of 30 parts chloride of cadmium, 70 parts chloride of zinc, and 15 to 25 parts chloride of sodium, which is roasted or melted, and after melting rubbed to a fine powder. The powder thus obtained may be used alone. It is applied to the soldering place and there melted in the ordinary manner with the blowpipe flame. In by far the majority of cases the use of a metallic solder will, however, still be found to be necessary. These soldering metals consist of metallic alloys, the melting point of which is, as already mentioned, lower than that of aluminum and its alloys. Such an alloy is obtained, for instance, from aluminum, tin, zinc, cadmium and lead, which are mixed in suitable proportions, melted together and then used in soldering in small pieces. A suitable proportion for the mixture would be: One part aluminum, 5 parts tin, 5 parts zinc, 5 parts cadmium, ½ part lead. In place of aluminum, alloys of the same nature, such, for instance, as nickel aluminum or magnalium, may be employed. In order to avoid the falling off of the soldered places in the case of aluminum solderings, which usually takes place in time, the solderings executed by means of the solder described are subjected to a subsequent treatment with a dilute solution of hyposulphite of soda by exposing the soldered articles or the soldered places for the space of one hour or more to the action of the soda.

A new solder for aluminum has recently been patented by Joseph C. Webster, of Philadelphia. The composition consists of lead, tin, aluminum and zinc alloyed as follows: Five parts of tin are melted together with 4 parts of lead, and to this are added 6 parts of melted aluminum. Next 1 part of zinc is added, and after the components are mixed thoroughly the alloy is poured into molds.

This composition forms an alloy which melts at a considerably lower temperature than the aluminum or parts to be soldered, and it is claimed that no flux or scraping of the aluminum to remove the oxide is required, and that the oxide that forms on the aluminum will not affect the joining of the metals or parts when the proper heat is obtained.

In employing this solder it is understood that the usual brazing fire of gas and air for imparting a high heat is used and into which the aluminum or part to be soldered is placed, it being advisable to avoid having too much back heat from the bricks. The parts to be soldered are heated until the outer surfaces brighten or slightly soften. It is best to keep the solder near the flame, so that when a joint is heated sufficiently the solder is ready to melt and drop thereon in sufficient quantities to solder the same, after which a small paddle is used to smooth over the joint. If the aluminum should get too hot it should be allowed to cool for about one minute. When the joint is finished, it should be allowed to cool slowly—that is to say, it should not be placed in water, for a quick cooling is apt to crack the soldered joints. After a joint is cooled and finished it has the appearance of pure aluminum and will not oxidize or tarnish.

"Two Thousand Miles on an Automobile"

The volume with the above title soon to be issued by the J. B. Lippincott Company, of Philadelphia, is thus modestly prefaced:

"To disarm criticism at the outset, the writer acknowledges a thousand imperfections in this discursive story. In all truth, it is a most garrulous and incoherent narrative. Like the automobile, part of the time the narrative moves, part of the time it does not; now it is in the road pursuing a straight course; then again it is in the ditch, or far afield, quite beyond control and out of reason. It is impossible to write coolly, calmly, logically and coherently about the automobile; it is not a cool, calm, logical or coherent beast, the exact reverse being true.

"The critic who has never driven a machine is not qualified to speak concerning the things contained herein, while the critic who has will speak with the charity and chastened humility which spring from adversity.

"The charm of automobiling lies less in the sport itself than in the unusual contact with people and things, hence any description of a tour would be incomplete without reflections by the way; the imagination once in will not out; it even seeks to usurp the humbler function of observation. However, the arrangement of chapters and headings—like finger posts or danger signs—is such that the weary reader may avoid the bad places and go through from cover to cover, choosing his own route. To facilitate the finding of what few morsels of practical value the book may contain, an index has been prepared which will enable the casual reader to select his pages with discrimination.

"These confessions and warnings are printed in this conspicuous manner so that the uncertain seeker after 'something to read' may see at a glance the poor sort of entertainment offered herein, and replace the book upon the shelf without buying."

Following is a table of contents, each subject being dealt with in a separate chapter:

Some Preliminary Observations; The Machine Used; The Start; Into Ohio; On to Buffalo; Buffalo; Buffalo to Canandaigua; The Morgan Mystery; Through Western New York; The Mohawk Valley; The Valley of Lebanon; An Incident of Travel; Through Massachusetts; Lexington and Concord; Rhode Island and Connecticut; Anarchism; New York to Buffalo; Through Canada Home.

Trade Literature Received.

The Barber Muffler.—A. S. Barber, of Brooklyn, New York.

Northern Multipolar Motors.—Northern Electrical Manufacturing Company, of Madison, Wis.

The Bell Odometer.—Bell Odometer Works, of Oakmont, Pa.

Darracq Automobiles.—The American Darracq Automobile Company, of 652 Hudson street, New York.

Sleeper Steam Engines for Automobiles and Stationary Purposes.—The Sleeper Engine Company, Limited, Que., Canada.

The Studebaker Pilot Light and Generator.—The Studebaker-Burnell Company, 1408 Michigan avenue, Chicago.

BEGINNERS PAGE.

The Fire Tube Boiler and Its Accessories.

The rate of steam generation in a boiler depends in every case upon the amount of metal surface impinged upon by the flame and hot gases of the fire. A plain vessel, while it may serve as a steam generator, is, therefore, not very efficient where weight and bulk are any consideration, and is, therefore, never used for this purpose at present. In the construction of automobile boilers metal tubes are always made use of.

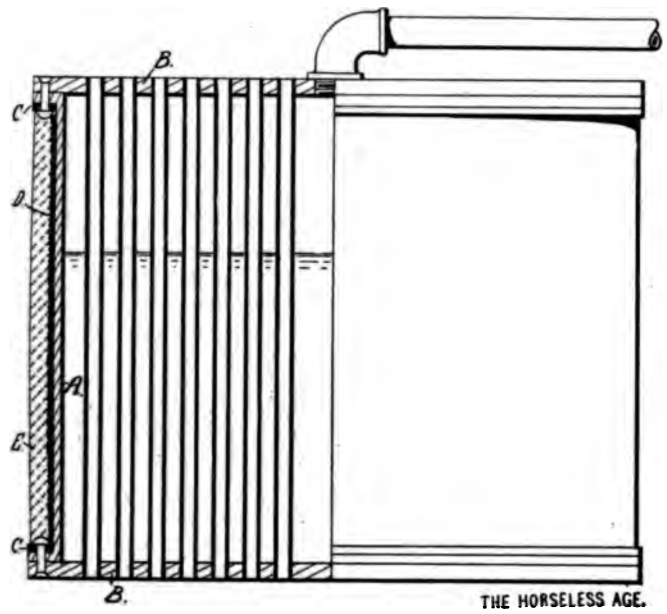


FIG. 1.

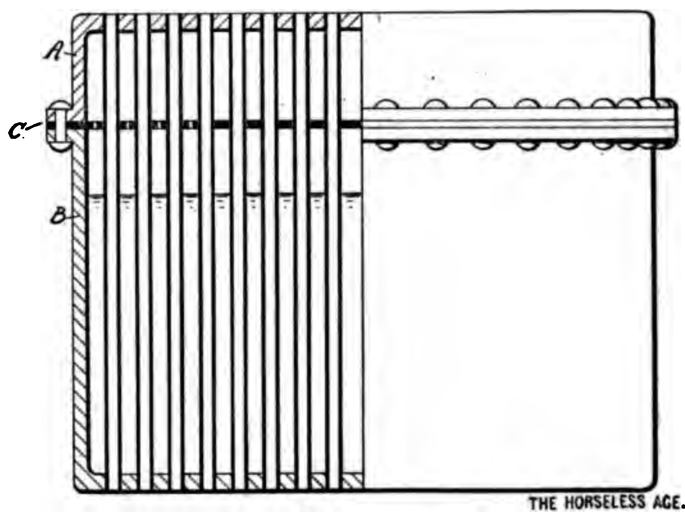


FIG. 2.

Automobile boilers are divided into three classes—fire tube boilers, water tube boilers and flash boilers. The latter may again be divided into flash boilers proper and semi-flash boilers.

A fire tube boiler consists of a cylindrical metal vessel through which pass a large number of metal tubes. The water to be converted into steam surrounds these tubes. In water tube boilers the water is contained within tubes, which at their lower and upper ends communicate with water and steam chambers respectively. Flash boilers, if we confine ourselves to the types in actual use on automobiles, consist of a coil of pipe into which the water is forced at one end, and from which the steam issues at the other.

Fig. 1 illustrates a form of fire tube boiler in half section, a type extensively used for light steam carriages. It consists of a cylindrical copper shell A and two steel heads or crown sheets B B. The shell and heads are riveted together, steel rings C C being placed under the flanges of the copper shell to take the pressure of the rivet heads. The copper shell is wound with a layer of piano steel wire D to give it additional strength against bursting, and the whole is covered with a heavy layer of asbestos E to prevent wasteful radiation of heat from the walls of the boiler. The heads are pierced, and the cylindrical vessel is penetrated by several hundred tubes, usually of ½ inch outside diameter. These tubes are "expanded" into the heads and slightly flanged. In this particular case the tubes are of copper.

To give an idea of dimensions, the boiler for a light steam carriage is usually about 16 inches in diameter and 14 inches high. The number of tubes ranges from 300 upward, and the heating surface—i. e., the combined surface of the lower head and the tubes—from 30 square feet up. The smallest boilers made are rated at 3½ horse power. The water is pumped into the boiler at the bottom, and steam is drawn from it at the top through the steam pipe F. There are various other connections from the boiler to attachments, as will be explained farther on.

When steam is used in the engine at a rapid rate and the fire is forced, moisture is liable to pass over to the engine with the steam, in the case of a boiler as shown in Fig. 1. The boiler is then said to be priming. To prevent priming is one of the chief objects of the fire tube boiler construction shown in Fig. 2. This boiler consists of two flanged seamless steel shells, A and B, the upper one of smaller depth than the lower one, riveted together with a so called "drying' plate C between. This plate is pierced with holes the same as the top and bottom shells to permit the passage of the fire tubes, and in addition with a number of smaller holes to permit the passage of the steam to the space above this dry plate. The tubes in this case are of seamless steel. The drying plate separates off a steam drying chamber corresponding to the steam dome of stationary boilers. Almost no water is projected into this space when there is violent ebullition in the boiler, and the heat transmitted through that part of the tubes which passes through the drying chamber effects the vaporization of the moisture which may succeed in getting into the drying chamber.

Another means to the same end, though perhaps not quite as effective, is to have the steam pipe extend into and across the steam space in the boiler, the pipe being closed at its end, but perforated with small holes along its entire length within the boiler.

THE SAFETY VALVE.

Steam boilers, after they are manufactured, are tested with hydraulic pressure about three times as high as the pressure at which it is desired to operate the boiler. One hundred and fifty pounds pressure per square inch has been the common practice in steam carriage work with tubular or fire tube boilers, but lately the tendency seems to be to increase this pressure. This pressure is maintained by an automatic device, operated by the steam pressure, which shuts off the fuel supply to the burner the moment the boiler pressure exceeds the point at which this device has been set. However, to further insure against the liability of excessive pressure in the boiler a safety valve is fitted, which is set to from 30 to 50 pounds above the adjustment of the fuel regulator. A sectional view of a safety valve is shown in Fig. 3.

The T at the bottom of the safety valve, designated by A is screwed into the boiler, and at the side the steam pipe leading to the engine is screwed into it. In the top part of this T is a conical valve seat to which fits the valve B with a stem passing through the valve guide C. Screwed to the T on top is the housing D, which contains the spring E pressing on the valve B through the intermediary of the saddle rod F. The pressure of the spring can be adjusted by means of the set screw G provided with a lock nut and a spring plate.

The action of the safety valve is easily understood. The spring E tends to hold the valve B down to its seat, but when the pressure in the boiler rises above a certain value the steam pressure against the inner valve surface exceeds the spring pressure

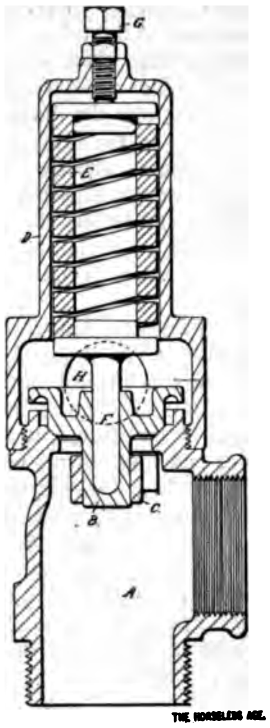


Fig. 3.

on the outer valve surface, and the valve opens. Steam then escapes through the valve, the opening H in the housing D and through pipes to the muffler, which latter arrangement prevents the sudden popping noise of the safety valve so liable to scare horses.

(To be continued.)

...COMMUNICATIONS...

The Contest Rules Critically Considered.

Reading, Pa., August 26.

Editor Horseless Age:

The New York-Boston reliability contest rules are at hand, and some comments may not be out of place. It is, of course, much easier to criticise the other fellow's actions than to point out a better way. Some features, however, could be improved, and these are worthy of notice.

The classification could have been bettered by separating the three motive powers and by classifying on the basis of weight in proportion to rated horse power, while a further classification should be made between vehicles operated by manufacturers and vehicles operated by private owners.

Motor bicycles are included, but no method of carrying an observer on them is suggested, which leaves one in doubt as to what will be done in this matter.

Electric vehicles may be recharged or batteries replaced at controls without penalty and probably without record. Certainly the time of recharging and number of replacements should be kept if any information is to result from this contest.

Two hours daily are to be allowed for lubrication, adjustments and repairs, but since reliability is the thing desired and a record of what transpires is wanted, it would seem advisable to make no allowance for repairs, adjustments or other work, for it is manifestly unfair to the vehicle that does not need attention to receive no credit for the two hours not used when a competitor badly in need of these repairs may be enabled by these two hours to make as good a showing.

The owner or the driver of a vehicle and his mechanic are permitted access to the vehicle, but no provision is made for this mechanic to get from town to town, so we must all enter three passenger vehicles or else we cannot have the advantage of the mechanic. There is room for a wide variation in results on this point alone. Local assistants may be employed, but what the poor fellow with one vehicle and no friends is going to do when the other ninety-nine vehicles have scooped up all the local talent is a hard question to answer. It is quite within reason to suppose that those vehicles having local agencies will be able to secure ample local assistance. It would seem that a fairer method would be to permit assistants to travel by train, automobile or otherwise, but to have the fact recorded by the observer. What the public want are the facts faithfully and fully recorded, and the manufacturer who has twice as many men traveling by train as he has machines in the contest will receive his due reward by a full and impartial statement of the facts. Touring conditions will not be found when there are 100 or more on the tour.

No engines, boilers, axles or wheels may be replaced. A broken wheel may be the result of a collision, a deep gutter or loose paving block unseen, and clearly such accidents should not be blamed against the vehicle. They are likely to happen to any tourist, and he would simply repair or replace the damage as quickly as possible. It would seem, therefore, that this rule is not as perfect as it should be, and a vehicle otherwise reliable may be put out of the run by locking hubs with someone and breaking an axle, or by burning a boiler, due to negligence of the operator induced by the unusual mental strain or similar cause.

Only such repairs will be permitted as may be made with the tools and extra parts carried on the vehicle, but there is no limitation as to the number and quantity that may be carried, so what is to hinder the touring trunk we so often hear about from being filled with an entire new outfit, engines, boilers, axles and wheels excepted. It would seem much better to allow each observer to make a list of the tools and extra parts carried, and include these in his report so that the public would know what sort of a portable machine shop is needed when they go touring.

T idea still predominates, but of stops are allowable without penalty. One may stop to carriage lamps, but evidently no or adjust them. He may stop t articles dropped by himself, but n vehicle preceding him, although t be allowable as aid in case of ac would have seemed much simple classed all stops in two classes— manded by the vehicle and those former only to be penalized, but to be recorded.

The fact that this is a race a tour is plainly brought out by the which is based on an average sp miles an hour. The laws of the t through which the route passes s miles as the maximum speed outsi cities; so how a contestant will b pass through cities at 8 miles per make an average speed of 15 mile breaking the law is not clear. thought it does not seem diffic miles per hour is only 7 less average maximum demanded, and ing 22 miles per hour for as many are driven at 8 miles per hour, th would be maintained, but the law States permit only a maximum of per hour, and one of the regulati "After a white flag is reached a exceeding 15 miles per hour wil mitted." How an average speed o an hour can be made when vehi drive slower and "will not be p to drive faster is too much for th mathematician.

Further, "any vehicle" may be fied if it fails to resist any attemp it at an excessive speed in any pl out reference to the rules. This is a clerical error, for the foot note the vehicle driver, but it seems ra on the driver to be obliged to ma erage of 15 miles per hour unde ditions when 8 miles only is per many places.

In conclusion it would seem thing desired is a full and comple of the service given by each veh that this service should not be ba miles per hour, but upon the cos and money of the stops and repa and that between two vehicles ma and 14½ miles per hour over course, no distinction should be m vided both have the same recor stops and repairs. The propose of rating deducts marks at the ra per minute as penalty for any slo than the average of fifteen. The sure to be some pretty lively hustli up to the average, and since if th penalty if the contest committee do sider the speed excessive, the dr willing to take risks will have th portunity.

A much better plan would be a margin so that a conscientio may have a little leeway without penalization on the one hand or fication on the other.

Chas. E. I

The Insurance Question.

NEW YORK CITY, August 29.

Editor HORSELESS AGE:

My attention has been called to your editorial suggesting the organization of a mutual insurance company to protect such automobiles as now remain unprotected for lack of facilities among the insurance companies to take care of all risks applied for. The history of mutual insurance companies throughout the world, whether it be fire, liability, accident or life, is not such as to make such a suggestion a wise one. It would be better to have a committee, representing the A. A. A. or some other similar organization, meet the officers of the leading companies, and by this means arrive at a mutual plan whereby both sides may be protected.

I have placed all applications filed with me for gasoline and electric machines, both for liability insurance and fire insurance, the latter covering both forms, that while stored at a given point or while on tours throughout the country. Fortunately for the owners and myself most of the applications have been for sums less than $10,000, and generally up to this amount I have found little serious difficulty in placing, although I am frank to say that wherever such policies have been placed, it has been accepted more on the grounds of friendship than strictly business. The rates have not advanced as rapidly as you seem to indicate. I have placed all my policies at the New York tariff rate for the buildings where they are stored, and when a floater policy is wanted it has been written at 3½ per cent. for the gasoline and electric machine, these policies providing that the companies shall be responsible for loss or damage wherever the machine may be within a given territory, generally the Eastern States.

The conflicting State insurance laws make interstate insurance difficult. As it is, before a floater policy can be effected, it has to make the rounds of a given number of State agents who are, by law, compelled to report the issuance of same to the insurance commissioner of that State for the purpose of taxation. Thus a single policy may be reported to half a dozen different insurance commissioners. This in itself makes the business unprofitable.

I have talked with owners of automobiles who have assured me that they have paid as high as 5 per cent. for a floater policy, and frequently they could not secure protection at this rate. That insurance on automobiles, of both fire and liability forms, is a necessity is perhaps recognized by all owners, but it is overlooked frequently until too late. I have never rejected a favorable application, but there are few brokers in the city who find it of sufficient profitableness to go after it, hence the apparent lack of protection. In New York city there are several storage warehouses where automobiles are kept on which the rate is higher than 2½ per cent.; hence it will be seen that a rate of 3½ per cent. is not very high, especially when it is remembered that the right is given under the terms of the policy to be "within the States of * * *," which includes these hazardous buildings, which, in themselves, are rated almost as high as the rate on the floater policy. There is one warehouse in this city on which the rate is $50 per $1,000, and even at this rate the owners are unable to procure sufficient insurance. It will be seen that a floater policy issued at $35 per $1,000 would save the owner $15 per $1,000 less than the building rate, besides granting the privilege of touring under full protection.

I think my suggestion of a conference to be the better way, and I will be glad to assist in such a consummation. I am sure that there are a dozen companies who would be glad to meet the owners of automobiles and formulate a standard clause and form to cover machines which shall embody the mutual agreements.

DIXEY HINES.

Wants Steam Carriage Discussion.

ROGERS, Ark., August 25.

Editor HORSELESS AGE:

Some months ago I saw an article in your paper about a steam turbine for automobiles. I would like to see this class of steam motor discussed further in THE HORSELESS AGE by some mechanical engineer, and more about steam automobiles, as to their future in competing with the gasoline automobile, particularly for long runs. According to my view, the steam carriage, if mechanical engineers would try more to develop its parts, would be far ahead of the gasoline carriage, as the steam engine is more reliable in every respect than the gasoline engine. As I stated, I would like to see more discussion on the steam carriage in THE HORSELESS AGE.

D. E. S.

First Experience.

Editor HORSELESS AGE:

I recently received a gasoline car built by a well known manufacturer, and so far feel perfectly satisfied except with the steering. I had an idea that a person might be able to steer and at the same time to think of something else.

The first day I ran 4 miles when I thought the engine was getting pretty warm and found that the chain to the circulating pump was gone. When I found the chain it was pretty well chewed up, the pump shaft was sprung, etc. The pump had leaked from the first and I was unable to find out where, but when I took it out for repair I found a blow hole in the casting, so I plugged this, straightened the shaft and took the corners off the sprockets, put on a new chain and was out for business again. If the points of the sprockets had been in proper shape the chain would, I think, have run all right, as it has given me no trouble since.

On my next drive you would have thought my machine was a steam, instead of a gasoline, as I soon had the water boiling in great shape. On examination I found both check valves stuck down. About this time I put in about a day piping over the whole machine, as there was not a joint in the water piping but what was too loose to hold water. I soon learned that my machine used just as much gasoline when standing still night and day as when running. This I have overcome by putting in a new Jenkins valve to replace the one originally fitted.

The rear cylinder has not fired its charge very well from the first, growing worse all the time. I have changed the mixture, tried the sparking, cleaned the "ignition' plugs and everything along the line, but to no effect. Today I made a pretty thorough investigation and among other things found that one cylinder was timed to fire its charge 5-32 inch before and the other 5-32 inch after the dead centre, so I adjusted this matter. I think I also found the cause of the back cylinder not firing its charge; the inlet valve did not work very free, the stem being too tight a fit.

I ran it about a mile tonight, and I find this cylinder is doing some work now, and by the smoothness of its running and the reduction of the noise I should think I had traded machines with someone, so you can see that I am doing fairly well for a person who had no knowledge whatever of a gasoline engine. I think I have given you a pretty fair idea of how I am progressing, although it has not been more than half told now.

J. W. LOVERING.

A Hill Climbing Feat.

BUFFALO, N. Y., August 25.

Editor HORSELESS AGE:

The accompanying illustration is taken from a photograph, for which we are indebted to Fred C. Carter, of Watertown, N. Y. The subject shows Mr. Carter, accompanied by three others, seated in his Buffalo tonneau light touring car, making

BUFFALO TONNEAU CLIMBING A GRADE.

the ascent of a 25 per cent. grade on a road leading to one of the parks of Watertown, the grade being Government survey. This is an interesting exhibition of the hill climbing qualities of the tonneau.

BUFFALO AUTOMOBILE AND AUTO-BI CO.

[The photo seems to have been taken from an elevation.—ED.]

How to Deal with Balky' Engines.

Editor Horseless Age:

Regarding the query about a balky engine by C. F. B. in your issue of August 13, I would say that gasoline motors are tricky and that their behavior is not twice alike. They actually seem to delight in puzzling a man when they can. I have handled some kinds for several years, and find that it is easy to get on to their tricks if you will watch carefully the results each time and note them down, so you will not be fooled a second time by the same thing. I have helped several men out of their troubles, but C. F. B. does not give facts enough to work on. My advice to him would be as follows: If your motor starts off when cool, and runs up to speed for a short time, it looks as if the ignition points were all right. Your battery current I should think was strong enough on the start, and should ignite your gas. It need not be a white spark—blue has more heat in it—but it should be a fat or thick spark, in order to ignite. Almost any kind of a spark will ignite a proper mixture until you compress it, when it needs more electric pressure. Your mixture seems to be about right. Now if the heat, as it increases, does not short circuit or change your current, it is evident your gasoline is not fed regularly to your cylinder, or you have not a proper mixture. The mixture is not rich enough, or the engine would continue to run all day, provided, of course, your current is strong enough. If your current gets short circuited or weak it will cause the same trouble of stopping. Test your spark in various ways that may suggest themselves to you, by connecting and disconnecting to the outside of your motor, to see if you have a leak. Also try to ignite the gas from the pet cock when open, as you turn the motor to see if the mixture will ignite. Now, on the other hand, if your motor draws in too much gasoline or too rich a mixture, after four or five minutes it will slow down, lose all power and stop, and you will not be able to start it running again by cranking it. To test or prove this to be the cause, shut off your gasoline, open the pet cock, turn on your ignition current and turn over your motor by hand until you have pumped out the excess of gasoline. If the mixture ignites at a certain distance from the pet cock, that is proof that it was too rich a mixture.

Again, leave the pet cock open and the electric circuit closed, turn on your gasoline very little at a time, and give the motor several turns. Notice what happens. If it doesn't ignite, open the generator gasoline valve just a little more until you get it to explode, which you can notice at the pet cock. Go at this determined to make it run, and it will run. See that your motor is well lubricated with a high grade of cylinder oil, 460° or 480° test. And when you have secured the proper results from the ignition outfit, close your pet cock, leaving everything else the same, and your motor should run continuously. If you ca get the gas to ignite at the pet cock give the engine an overcharge of gasoline or a very rich mixture, and try the same thing over again. If all conditions are right your motor will run, and if your balance wheel is heavy enough it will continue to run until you stop it.

If all of these things fail try a better grade of gasoline than 62° benzine or common stove quality. Get 70° naphtha or even 76°. The latter grade is often necessary in winter, but should not be in hot weather. To make your motor start easily or without danger, see that your piston head is on the compression centre when the charge is ignited, and that you can move the spark point at least 22½° ahead of that centre, which has proved to be the best point for speed of certain motors. F. L. L.

Design and Workmanship.

Reading, Pa., August 29.

Editor Horseless Age:

Mr. Clough's able article on design and workmanship throws some blame on the manufacturer that should be charged to the state of the art. For example, it has been our experience that every new man put on cylinder boring has been unable to produce round cylinders, and no amount of honesty on the part of the manufacturer has served to prevent this. We have not only had this experience ourselves, but when we have had cylinders bored by engine builders, the result has been the same. The reason is simple, but an explanation of it does not correct it. A man must learn by actual experience before he will accept our statements of the matter and do the work as it should be done. Automobile cylinders are lighter than those used in stationary engines, and the methods of clamping the cylinder in stationary work will not serve for automobile work. We have found this trouble so often that we know just what to expect when a man is broken in on the job. Now, since experienced men cannot be hired but must be made, it is quite evident that some leeway should be given the manufacturer in the matter of workmanship. It is true that good mechanics know and have known for generations how to cut a full thread and fit a nut to it, but the public at large insists on cheap standard threads and things of this sort, and we are daily advised to give them what they want. As a matter of fact, we do not use standard threads because we do not wish the cheap stove bolts mentioned by Mr. Clough put into our vehicles at some future time by some man who has carelessly lost a bolt. Further, we use steel bolts and screws whereas many of these things bought in the open market are made of the commonest kind of poor iron, and it is only by using a different size or different thread that we can avoid the cheaper and less reliable article being used. In order to render repairs easily made we dare not deviate mmon parts, so we have sible bicycle sizes, and every well equipped machine sho supply house contains the tools fc the screws used, but the screws t are selodm found in stock.

While it is true that good tinne had who know how to solder, true that a manufacturer must lea perience where his tank is going and break before he can put in sta the proper places, and this must b to inexperience and not dishonest

There is no excuse at this date powered vehicles, for good motc design is at least a half dozen yea this country, as was shown by th *Herald* race in 1895, where the wi hicle traversed 70 miles of snow inches deep with a frozen crus enough to bear pedestrians, and without any supplies, "mechanics by rail" or local assistance except could be found on a holiday. It shown by an American vehicle wi Liberty day run November 14. England, where the first, second a winners of the Paris-Bordeaux r beaten more than an hour in 52 m that these designs were practical evidenced by the fact of their bein stant use since and still giving goo Further, every automobile manufac had the experience of locomotive an car makers to guide him, so that not go wrong in the matter of po need any buyer purchase an under carriage if he is willing to inquire about him just a little. Good r scarce, but hills, sand and ba abound everywhere, and no man should put out or purchaser buy that has not been tested over all roads both winter and summer.

In the matter of material someth may be said. The automobile buil buy what he can get until the art such importance that makers of will undertake to supply the proper required. This was true in the ea of the bicycle business when, for we used ⅛ inch spokes instead of t piano wire spokes of the presen times more durable, and it will be the automobile business.

Chas. E. Du

Circulation Indicator Alrea Use.

London, Augu

Editor Horseless Age:

Referring to your issue of Augus a suggestion made by W. Howard to place a gauge dial on the dashb the car to show if the circulating working, this is already carried out pier cars. We have put a water ga indicating the circulation on every car sent out for eighteen months, works quite perfectly, and anyone c out Mr. Payne's suggestion will b pleased with the result. S. F.

Boiler Query.

ROCHESTER, N. H., August 28.
ORSELESS AGE:
e principle of the flanged radiator lied to fire tube boilers?
r words, could the efficiency of a boiler be increased by having the awn with external longitudinal rojecting in the water space as far istance between the tubes would
E. D.

ng could be gained, we believe, by xtending into the water, as the l abstract the heat from the metal h more readily than the walls will it from the heated gases. The lace, theoretically, for the flanges would be on the inside of the tubes so flanged were readily ob- in the market, the experiment worth trying, since a certain in- heat efficiency could undoubtedly d.—ED.]

ser Opposes Scorching.

PRATT, Kan., Aug. 29.
RSELESS AGE:
reading the accounts of the re- mobile accidents the question my mind, "What is to be the this fast driving?" It seems that desire of the wealthy is to get breaking car which will tear public highways, striking terror ople's hearts, but little do they e setback it is giving the auto- If these people would be con- ith a moderate speed, say not r 30 miles an hour at the outside, d see that more precaution was e driving, the auto would be on ay to rapid advancement. Of e few factories that are inter- the manufacture of these ma- e most of them still working neet the demand for their ma- nt if this disease of "highway ras stamped out there would be ce in the industry that would ven the manufacturers: at least I have heard that would be the

there is a great pleasure in run- ing machine that will rip along e of 40 to 50 miles an hour, or l while you are rapidly turning the road see a horse scared into ne pedestrian making high leaps e of safety, but I believe if the who was "at the wheel" was the place of the flying pedes- e would be some hard feelings le. The average man does not ways keep his eyes in the back l while strolling across a subur- or while out in the country l, to watch for a streak of dust a very short space of time will to a machine and rider, the lat- r over the wheel with distended y scanning the road ahead and his features contracted into the shape of a shriveled pumpkin as he flies past the rearing horse or a man who has climbed to the top of the nearest tree or telephone pole for safety. For my part I think it is time to call a halt on this kind of driving, and I believe that I have many sympathiz- ers among the motor car owners of this country. If the Frenchmen want to keep it up let them do so, but let the auto- mobilists of this country show their for- eign brethren that we have a little more respect for other users of the road. THE HORSELESS AGE has been most urgently showing the folly of this fast driving, but still every day's paper gives an account of some accident caused by careless driving.

If a national league were organized with rules and regulations to prohibit such fast driving, which would set a reasonable speed for the maximum limit and help the en- forcement of such rules there would be more satisfaction for the people who, like ourselves, are compelled to use the public highways for travel.

Most of THE HORSELESS AGE readers probably noticed the last few issues con- tained an advertisement of a machine for sale by Mr. Burbridge, of Woodstock, Vt., stating that he wished to sell his ma- chine because he was the only owner in his town and that his reason for doing so was the prejudice shown against it by the people. Now why are the people preju- diced?- That is the question. Is it not from the fact that they have either seen or heard of numerous runaways caused by these machines, and maybe had the pleas- ure (?) of seeing someone knocked down and run over, not by Mr. Burbridge, but some automobile tourist? Some drivers think that because they are out of their own community where they will not be known, they may be as reckless as possible and fear no evil consequences. Everyone will remember the reputation the bicycle scorcher received, and let us now hope that something will be done to clip the "auto scorcher" in the bud, that there may be more safety on the high- way.

How much more pleasure there is in letting your machine hum along at a mod- erate pace, say 15 or 20 miles an hour, while in the country and enjoying the scenery as you go, than to rush along at the limit produced by your machine with grit and dirt flying on every side and the rattle of the machine while striking bad places in the road. I believe I have been the first to forcibly express myself on this subject, but I, like my namesake, am in the habit of saying exactly what I think, and in words that may be understood. Let us have a national league of motor- ists, who will abide by a speed rule them- selves and see that those who are lacking in judgment are forced to do so. I hope you will uphold me in this decision and that all of the readers may express their opinion on this subject at an early moment before we are confronted by an uprising of the populace which will come sooner or later unless something is done to stop this "scorching fever" on the high- ways, where it is dangerous to life and limb.
JAS. G. BLAINE.

Explosive Engine Queries.

Editor HORSELESS AGE:

I am building a double cylinder gas en- gine with the dimensions given below. What horse power should it develop run- ning at 800 revolutions per minute, and are the principal measurements consistent, and do they conform with the best practice?

Two cylinders, 5 inch bore, 6 inch stroke, cranks set at 180 degrees; com- pression, 77 pounds; exhaust value, 1¾ inches diameter, 11-32 inch lift; exhaust pipe, 1½ inches; inlet valve, 2 inches di- ameter, 3-16 inch lift; inlet pipe, 1¼ inches; flywheel, 17½ inches diameter, 125 pounds in rim.
MAC INDOUBT.

[Your dimensions correspond fairly well with average practice, except as to the intake valve. As you have given the lift of the valve we suppose that it is mechan- ically operated. In that case we should make it the same in every respect as the exhaust valve, so that the intake and ex- haust valves, as well as their cams and springs, are interchangeable. With auto- matic intake valves the more common practice is to have them somewhat smaller than the exhaust valves, but your scheme of a large diameter and small lift of valve may not be at all bad. The horse power (brake) should be about 12.—ED.]

As Seen by a Western Reporter.

[*From the Peoria (Ill.) Star.*]

Charley Carroll has an automobile—one of the latest fashion and thoroughly up to snuff. Last evening Charley took in Henry Sandmeyer, Dr. Cannon and an expert from Chicago and the four sailed around town the envy of all observers, the glass of fash- ion and the mold of form. Finding the streets too crowded down town they went on the bluff and scorched up Moss avenue at a great pace. Having exhausted the de- lights on this thoroughfare they went across to University place, and here, while running at the rate of 75 miles an hour, they ran slap into a street that is just being paved and has 17 inches of mud over its surface. Whiz! zip! bang! and the auto went over on its side, throwing Sandmeyer into the air. When he went up he met Carroll com- ing down, and they both landed on end on the Chicago expert, who was trying to find the bottom of a mud puddle. Sandmeyer walked to the nearest telephone, secured a carriage and came back to town. Cannon walked in, while Carroll and the Chicago expert stayed by the machine until 5 o'clock this morning. The auto is still on its side, a melancholy testimonial to the fact that a machine can't run on its side.

...OUR... FOREIGN EXCHANGES

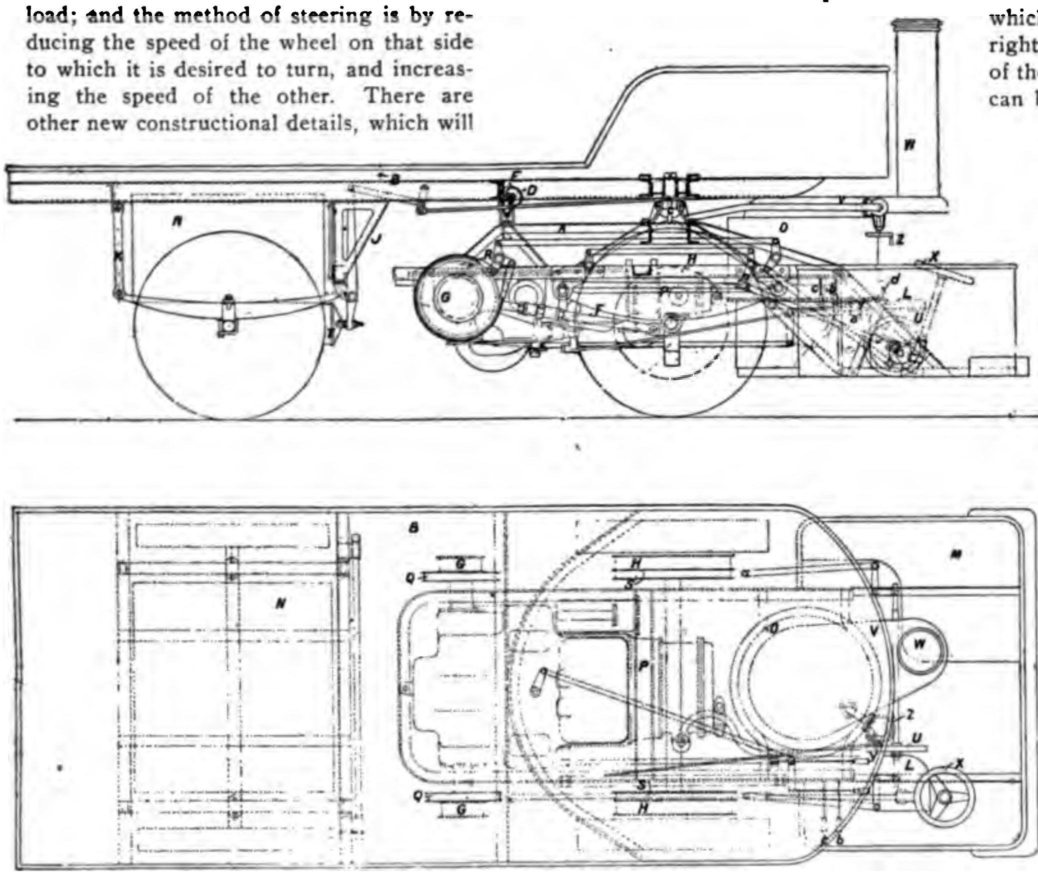
Front Driven Coulthard Steam Truck.

The accompanying engravings and drawings show the outside appearance, the details of the general arrangements, and the boiler, gearing, etc., of a new steam driven motor lorry which has just been constructed to the designs of Dr. A. W. Brightmore by Messrs. T. Coulthard & Co., of Preston, England.

It will be seen that this lorry possesses certain points which are not possessed by other vehicles of a similar nature. Thus, the front wheels are used both for propelling and for steering; the machinery is all below the level of the platform, thus leaving the whole of the latter free for the load; and the method of steering is by reducing the speed of the wheel on that side to which it is desired to turn, and increasing the speed of the other. There are other new constructional details, which will be fully appreciated by an examination of the drawings. For instance, the front wheels, which carry the whole of the propelling machinery, are attached to the underframe by means of a ball and socket joint, which we shall describe more minutely later on.

The central idea worked to was to attach a motor to a road vehicle in such a manner as to give all the elasticity between the two that obtains in the case of horse drawn vehicles. The connection of a horse to a vehicle permits of relative movement between the horse and the vehicle in vertical planes transverse to the direction of motion. Also, the resistance of horse to being turned about by the shafts prevents the front wheels from being diverted from the direction in which the horse is being guided. In order to copy this as nearly as possible in the motor vehicle, Dr. Brightmore arranged to carry the propelling machinery on a frame supported on the front axle, a ball and socket joint, as already mentioned, connecting this frame with the underside of the body of the vehicle. This arrangement, as he himself puts it, corresponds to the traces in a horse drawn vehicle. Of course, if there were only this connection between the front carriage and the body there would be nothing to prevent the wheels from running forward away from underneath the body, and, therefore, in order to keep the forecarriage level in the longitudinal direction, an arrangement is made by which a slide or gripper fixed to the forecarriage could travel on a semicircular path made of angle iron. This sliding arrangement is intended to correspond to the inertia of the horse, and to prevent the front wheels being diverted from their course by an obstruction, such as a stone, in the roadway, for a certain definite tension is put on the gripper. The whole of this mechanism has been designed with a view to preventing strains being communicated from the carriage platform to the machinery.

The slipper and grip gear at present fitted is shown in Fig. 3. There is a circular angle iron E, 3 inches by 2 inches with ½ inch webs, attached to the underframe, so that the 2 inch side is parallel with the und. This is the portion on which the gripper slips. The gripper itself is 6 inches across. In the figure A is a horizontal pin connected to the back of the forecarriage; B is the slide; C is the portion which slides on the underside of the angle iron; D is a spring regulating the pressure of the slipper on this angle iron; and F is a stud by which the pressure of this spring may be adjusted. The slide is stiffened by two strong webs at either side. Not being quite satisfied that this arrangement is absolutely the best, Dr. Brightmore has devised another method of control, which we show in Fig. 4. As will be seen from the drawing, the shaft C of the differential gear is provided with a sleeve D. To this shaft C the bevel wheel on one side of the differential gear is fixed, while the bevel wheel on the other side of the differential gear is attached to the sleeve D. Bolted to this sleeve is a pulley A, and secured to the shaft C is another pulley B, which carries four slippers E, placed at right angles to one another. Inside each of these slippers is a rubber block F, which can be compressed to the required degree by the screw plug G. In the drawing H is the steering drum, and I the chain pinion. The action of the apparatus is evident, without further description.



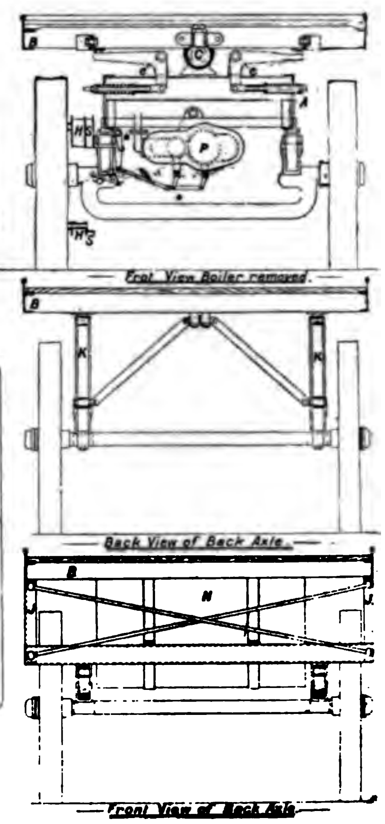


FIG. 1.—GENERAL VIEWS OF COULTHARD LORRY.

Passing on now to the other parts of the lorry, we may mention, first of all, that it is only the second vehicle of its kind which has been made. The first was of lighter build, and there have been sundry alterations in design made in the second vehicle. The present lorry is designed to carry 5 tons, the dimensions of its carrying platform being 16 feet by 6 feet 6 inches. The height of this platform is 4 feet 6 inches

The wheel base is 8 feet, and the diameter of the wheels 3 feet 6 inches. The breadth of the front or driving tires is 7 inches, and of the rear tires 6 inches. The lorry consists of the forecarriage A and the platform B, connected together by the ball and socket joint C over the forecarriage. The slide or gripper D is pivoted on a horizontal pin behind the forecarriage, and moves in a circular channel E, attached to the carrying platform. The forecarriage, as will be observed, is a triangulated frame of angle steel. It has a light appearance, but is so well designed and braced that it sure exerted by which can be governed by means of screwed ends and nuts. The back ends of the springs are connected to the platform by links K, having diagonal stays for lateral stiffness, both links and stays turning on a common horizontal axis to allow for the play of the springs.

The driver's seat L is on the right hand side of the driving platform, attached to the forecarriage, and all the handles necessary for the control of the vehicle are within reach of this point. For example, Y is the handle for regulating the point of cut off and for reversing; Z the throttle top of the tubes, and there is a fusible plug in the centre over the furnace. There are two feeds to the boiler, the first being geared to the engine, and only pumping when the latter is at work, and the other being a small horizontal Marsh pump, which is used when the vehicle is at rest. Both pumps are connected to the boiler through a combined plug and check valve, so that the plug valve can be shut and the check valve examined while the boiler is under steam. The working steam pressure is 200 pounds per square inch, and pressure and water gauge fittings are placed so that

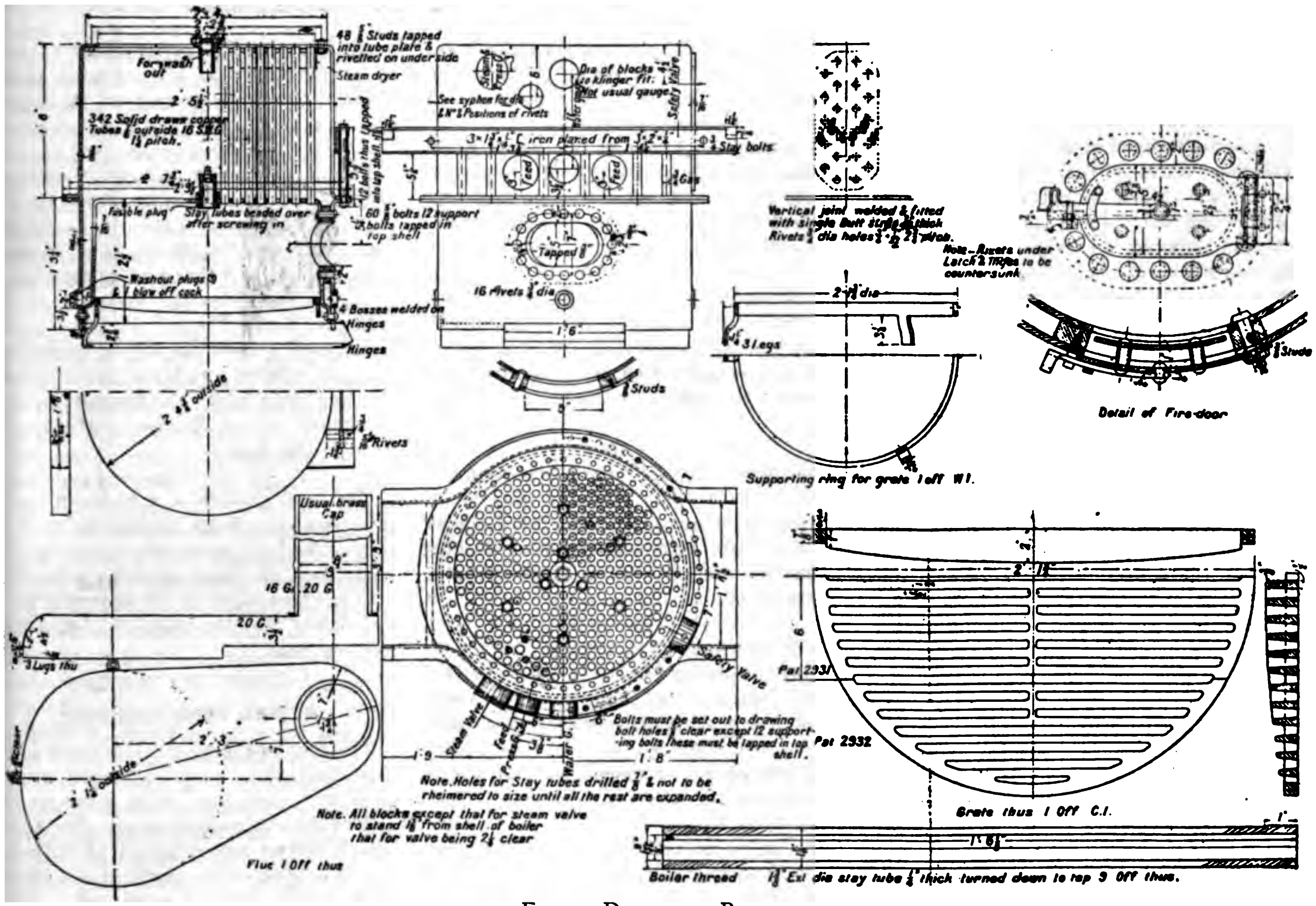
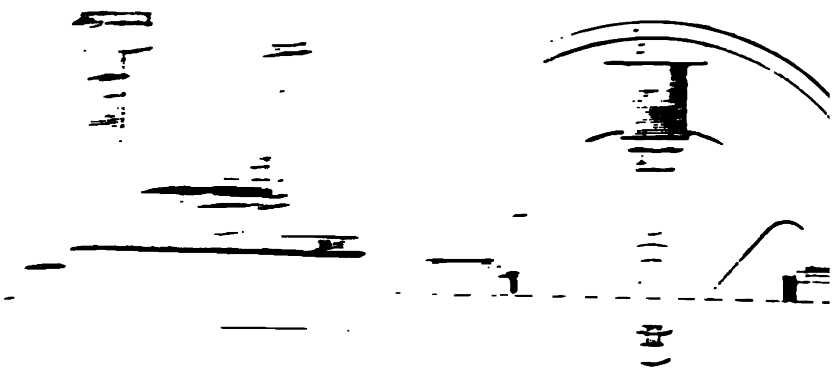


FIG. 2.—DETAILS OF BOILER.

is evidently amply strong for its work. Radius rods F are pivoted on the front axle and on the bearings of the differential shaft of the driving mechanism, which is connected to the frame of the forecarriage. This frame is mounted on the springs of the front axle by means of slides, so that free horizontal movement of the springs is possible. The pull on the carrying platform is transmitted from the driving axle, through the radius rods, frame and forecarriage, and eventually through the ball and socket joint. Chain pinions G at either end of the differential shaft drive chain wheels H, which are connected to the front wheels by Hans Renolds chains.

The front ends of the back springs are pinned to a horizontal steel channel attached to two brackets J beneath the platform. Lateral stiffness is given to these brackets by two diagonal tie rods, the pres- valve; *a* the handle for changing the gears; *b* is for opening the cylinder drains; *c* admits high pressure steam to the low pressure cylinder; and *d* regulates the feed to the pumps. On the opposite side of the driving platform is a bunker M, with a capacity of 2½ hundredweight of coke. A water tank N, with a capacity of 170 gallons, is carried over the back axle. The boiler O and engine P, with all their various appurtenances, are carried on the forecarriage, the former in front of the forward axle and the latter behind it. The boiler, a detail of which is given in Fig. 2, is of the fire tube type, and has 108 square feet of heating surface, with a grate area of 3.75 square feet. There are 342 tubes of ¾ inch external diameter, and nine tubular stays arranged round the centre, as shown on the drawing. There is also a drying space for the steam at the they can be easily read by the driver. The smoke box is connected to a horizontal flue V, which, we are informed, acts as an effective spark arrester. This terminates in a vertical funnel W, which comes immediately in front of the carrying platform.

The engine is one of Messrs. Coulthard's design, and such as they apply to their own lorries. It is horizontally placed, and is a reversing compound with high and low pressure cylinders 4 inches and 7 inches in diameter respectively, the stroke in each case being 6 inches. The gear works in an oiltight casing. The engine drives through a first motion shaft on to spur wheels on a second motor shaft around a differential gear. On either side of the latter is fixed a steering drum Q, in Fig. 1. The brakes R working on these drums consist of a special steel wire rope, ⅜ inch diameter, carrying gun



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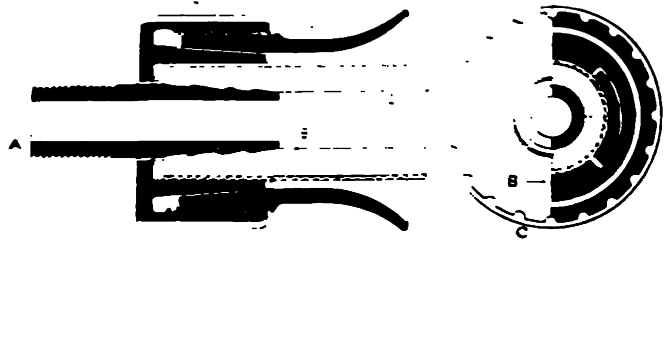
minute.

In a recent test [illegible] weighed load equal [illegible] tons [illegible] to other weights [illegible] about [illegible] ton, the lorry was taken [illegible] to Longton and back [illegible] distance of some 12 miles. [illegible] met with on this road and it was [illegible] easily with the [illegible] miles [illegible] the boiler pressure rising [illegible] the climb. A speed of well [illegible] miles an hour was attained on the [illegible] reaching as high as 8 miles [illegible]. The car can be maneuvered [illegible] space, and can turn [illegible]. The fact that the [illegible] be moved around by hand [illegible] be turned until the [illegible] over an uneven decline

A New Hose Coupling.

[illegible] represents [illegible] for fasten [illegible] as is sometim [illegible] work. The [illegible] end of the [illegible] metal pipe is m [illegible] rubber tubing [illegible] end of this nip [illegible] wrapping th [illegible] with wire wh [illegible] there is a c [illegible] segments, [illegible] is drawn by [illegible]. The part C [illegible] and bell mouth [illegible] rubber pipe from [illegible] this way dam [illegible] by an English



SSONS OF THE ROAD

r of Change and Freedom from Care."

By Chas. E. Duryea.

eautiful valleys lie southeast of Down one the Schuylkill winds ›etween beautiful lines of hills on , their tops sweeping in curved the flight of a bird, which won Indians the title of Flying Hills, the other the bold prominences of k Mountain and Mount Monoca- ıt a widely different appearance, none the less beautiful. The road ıbing nearly to the top of Never- ı the river many feet abruptly be- ds along the riverside with few cept at the canal bridges, and rchanging views of the river, the ıe railroads and the mountains. eastward lies the Oley Valley, a ertile, beautiful rolling country, ith farms and little villages, with church spires and a rich, pros- opulation. This extends more or illel to the Schuylkill for many :d terminates at Reading in the ıp between Mt. Penn and the k. Through it extend a number roads, some toll pikes and others :rally in good condition any kind :r, and offering a most beautiful the pleasure seeking automobilist. ocer wanted a ride; so he pro- iting his father, who lives 5 miles ottstown, and promised a good n our arrival. So one bright we, including an artist and our :h an irrepressible seven year old :ed about 9:30 for that dinner. :le was a tonneau, having ample for four in the rear, while the ›ied the front seat. Most of the were of portly build, and the hed fully 1,100 pounds, as much hicle itself. The vehicle was a in process of testing, neither ır upholstered, and had been run r times. All Saturday afternoon :n out on a trip, and the driver t in fine condition, except that it nsiderable oil. It was filled with oline and oil late Saturday night, ırted away without further atten- morning. The bright sun, clear e and pleasant riding roused good spirits, and made every he road enjoyable. Nearly all taken on the high speed, and an ›eed of 12 miles per hour was l. A number of scary horses were ısitating stops, and at one time ost his hat. He climbed out and or it, only to find that the vehi- een stopped, reversed and was : hat by the time he had picked it up. No attention was given until our destination was reached, where the vehicle was looked over and the oil cups refilled, nothing else being done. After a splendid country dinner the entire family were given a ride over some good and bad roads in their locality, and all came back highly enthusiastic over the splendid riding quality of the horseless vehicle, a complete reversal of opinions expressed but a few minutes before in favor of horse vehicles.

If everybody could be given such automobile rides there would soon be no automobile antagonists.

A little later it was proposed to visit Ringing Rocks Park, a pleasure resort on top of a prominence near Pottstown, where among other attractions are a great pile of rocks, which, being of a metallic nature, emit a ringing sound like a piece of steel when struck with a hammer. From this point an excellent view of the surrounding country for miles may be had, and although a little inaccessible by automobile, because of the bad roads, the trip was much enjoyed.

From here we turned eastward toward Swamp pike, one of the roads traversing the Oley Valley, and along this we headed toward Boyertown and supper. We soon passed a signboard marked "Pottstown, 6 miles," and a mile or so later another showing the same distance. This attracted our attention, and we kept account, finding all told seven signboards in about that many miles, each one marked "Pottstown, 6 miles." We supposed we were nearing Readirig, and guyed the grocer (who claimed to be acquainted with the country) most unmercifully about chasing us around in a circle so as to get more ride. As a matter of fact the road follows a bend in the valley, and the distance from Pottstown does not vary largely for a number of miles.

At Boyertown we found a pleasant hotel, and although everybody protested they were not hungry after such a big dinner, they all admitted that the supper was most enjoyable, a sure proof of its excellence and of the appetizing effect of automobiling in pleasant surroundings. After supper we headed toward Reading, 18 miles, and having some time to spare made a circuit of 3 miles to dodge a toll gate, reaching home about dark, having had a day of complete change and freedom from care, with splendid natural surroundings. Total distance, 65 miles, with absolutely no troubles except filling the oil cups, which distance in connection with the 25 miles the day before made a 90 mile test of a new vehicle without mechanical trouble. The pleasure of the trip so appealed to the entire party that we have promised ourselves another in the very near future.

A match is announced for the near future between Lorraine Barrow and Count Valdelagrana on the road from Biarritz to Madrid, with 24 horse power machines of different make.

A New England Tour—Springfield to Litchfield and Back.

Although the County of Berkshire offers an almost inexhaustible field for the automobile, both on account of the variety of its scenery and the excellence of many of its highways, yet there are moments when one is tempted to pass its boundaries and explore what lies beyond. It was with such an idea that we started forth on one of those bright, autumnlike mornings with which we have lately been favored. Hartford, Conn., was our prospective destination, and a glance at the map seemed to indicate that our route must lie through Winsted, reaching the latter town by way either of New Marlboro or Otis. As far as New Marlboro the first route was well known to us, but previous experiences on the rough hill roads in the eastern part of the county made us wary of the descent into Connecticut by the western road. We had heard vague rumors of the beauties of the Farmington River Valley, and the contour lines of the maps of the United States Geological Survey seemed to indicate a gradual descent and an entire absence of alarming grades. In addition, our minds had been influenced by the knowledge that this was an old post road, perhaps one of the several mythical routes which Burgoyne's army had taken eastward after Saratoga. Besides, we recalled that a railway through this valley was a stock topic of discussion in the county press when sources of news ran dry.

From Lenox through East Lee the new State road afforded plain sailing, and save for a rough bit on the north shore of Greenwater pond, the road as far as Otis, 12 miles from Lee, gave little cause for complaint. From this our course lay through a strange land and the road grew gradually worse and worse. As the stream which we had been following grew into the proportion of a river, the valley became narrower and the hills rose from the banks to a considerable height. What was most astonishing was the absence of human life. From Otis almost to the State line, a distance of 12 miles, we failed to see any persons or to meet even a horse which might be startled at our modern means of locomotion. Every now and then we passed the ruins of an abandoned mill, of which even the dam had been swept away. Except in the hamlet of New Boston, Nature had been left to herself and the result was one long passage through thick woods. But the effect of this abandon was disastrous upon the road, and the pleasure of descending the valley upon the very bank of the rushing river was sadly marred by the necessity of incessant care in order to avoid the rocks and the mud holes which made up the surface of the highway. However, as we approached the State boundary our hearts were gladdened by the sight of a caravan of wagons filled with road making machinery, a gift to this remote region, we were told, from the Massachusetts Highway Commission. Such

a present, even if it could only arrive by way of Connecticut, should be welcome to the inhabitants of this part of the State, and I know of no place where the need for it is greater. The thought naturally comes to mind as to what the future of a good road in this thinly populated region might be. The winters are long and severe, and the inhabitants are not likely to have a large surplus in their town treasuries. On a through route, such as this, a good road should be more necessary than a railway in more populated districts, and with the increased efficiency of motor vehicles which is sure to come the maintenance of the highways becomes a vital matter. And here it seems to me that the State should step in. Not merely content with building permanent roadways, it should make it its business that the through routes are maintained. Every civilized country on the continent of Europe has come to this conclusion, and all the chief highways are nationalized, that is, kept in order by the central Government, and not left to the caprice of the local authorities. For the question is of as much moment to the inhabitants of the State at large as to those of the immediate vicinity.

Half a mile beyond the State border we stopped at the cross roads store of Colebrook River to change a punctured tire and at the same time seek information as to our future course. Opinions differed as to the proper road, so we determined to make for Winsted. For a while we followed the Farmington River and then struck across some hills, the roadway gradually improving until the last few miles, which were over a hard macadam surface. In Winsted we were informed that Hartford was still 28 miles away, and that the roads in that direction were indifferent. So we were advised to go to Litchfield, which was said to be but 10 miles distant, and lunch there. South of Winsted we found ourselves on a wide graveled highway which ran alongside a railroad track in a depression between parallel lines of hills. At the end of 10 miles we entered Torrington and discovered that Litchfield was 5 miles further in a westerly direction. The road from Torrington was quite good, but hills began to rise above hills and the ascents were steep. Now we were in a region where motorphobia in its most acute form seemed to be epidemic. The horses did not appear to be much frightened, but their drivers certainly showed fear, and the occupants of most of the vehicles took to the bushes and there awaited developments. In an attempt to avoid a frightened old woman, our hind wheel slipped into the ditch and it took a pair of oxen and much time before we could extricate ourselves from its soft bot-

...t we got up to Litchfield and rode its wide elm shaded streets, ...tch toward the four points of the ...rom a common centre. After ...heon, we set about finding a ...hich we might return home.

We had provided ourselves with a publication purporting to set forth the good roads of New England and distinguishing them from the bad by a most liberal expenditure of crimson ink. On one of the maps in this pamphlet we found a scarlet line marked the "Goshen turnpike," which stretched away from Litchfield in the very direction we wanted to go. Here then was our opportunity and off we started. We had imagined ourselves already at a pretty good altitude, but soon found there was more to come. Our way lay on the top of a bare ridge, elevated above the parallel valleys, but ever with an upward tendency. It was a succession of steep pitches; at times the machine seemed to point starward, and the road grew rougher and rougher. How we longed for a chance to annihilate the publisher of our map book! We inquired of the few persons we met, and we were assured that we were on the right road. At last, after one hour and a half, we met a gentleman who informed us that no vehicle, much less an automobile, could proceed further. Still we kept on, and at last reached the highest point whence a vision of the familiar outline of the dome of Mt. Everett greeted us. But Massachusetts was still far away, and the mountain which marked its southern corner was only visible through a gap in the hills north of us.

Encouraged by this view, we began our descent toward the Housatonic River. And what a descent it was! A recent cloudburst had swept away what little roadway there had been, and had left nothing but a tangled mass of stones and bushes. Our heavy rubber tires bounded from rock to rock, and it was only by dint of great care and accurate work with the steering wheel that we were able to avoid a wreck in one of the deep gullies with which the hillside was lined. There was also plenty of work for all our brakes, for the grade downward was not slight; used as we were to steep pitches in the hills between the Housatonic and Westfield rivers, we had something to learn about Connecticut roads. With such highways the Legislature of the State may well hestitate to increase the automobile speed limit out of respect to the motorists themselves. The descent safely accomplished, we reached a tributary of the Housatonic, and later the main river, near Falls Village. Thence an indifferent, but fairly level, road took us to Canaan, the last town in Connecticut. Here we met a real steam roller engaged in turning the streets, which were formerly almost impassable because of sand, into beautiful stretches of macadam. Surely there is some hope left for this part of the State if more such machines could be provided. Another mile brought us into the old Bay State, and we proceeded homeward up the level central road of the county, which is so well known to all drivers of automobiles.

Our day had been a long one, but according to the maps of the Geological Survey we had gone 103 miles, and this over every sort and variety of road that the genius of man or of the elements could devis... the trip was a triumph for the autc... for it showed what this modern m... locomotion is capable of, even in i... ent undeveloped condition, and ov... ways which were such only in ... *Cortlandt F. Bishop, in the Springf... publican.*

Cleveland A. C. "Matine...

The Cleveland Automobile Club ... series of informal races at the R... race track, a half mile track, on ... 23. Alexander Winton, with his ' ... covered 5 miles in 7:25½, making ... mile in 1:26½, which is said to be ... for a half mile track. In a 5 mile ... tween Alexander Winton and C... Shanks in Winton touring cars ... won in 9:26, Winton having quit ... end of the fourth mile. James Mo... R. Owen had a 1 mile race in Olds... It was very close, Moore winning I... in 2:24. Charles B. Shanks and E. ... Reese were to have had three rac... 1, 5 and 10 mile courses. Only ... race was run, something being ... with Reese's machine. Shanks wc... in 2:05. There were twelve starter... event to see who could drive a m... mile in the nearest to three mint... was won by H. C. Dwyer, who m... mile in 3:02. The time made by th... was as follows: Otis Southwort... E. Shriver Reese, 3:12; Cha... Shanks, 2:27; Alexander Winto... Ralph Worthington, 2:57; E. J. ... 2:33; Thomas Henderson, 3:32; H. ... 3:05; J. Moore, 3:41; W. M. Wrig...

At Oak Park, Ill., the chauffeur ... Farson was fined $10 recently for ... driving. When sentence had be... nounced the defendant's attorne... again and pleaded for a remittanc... fine.

"This defendant," he explained ... poor man. Think what $10 means ... To you, your honor, $10 may seem ... small amount, but think of the h... that my client must suffer if you ... him to pay this money."

Thus he went on, and finally the ... moved to pity, said to the attorney ...

"If you will charge this poor m... ing for your services in defending ... will remit his fine and ask him to ... the actual costs of the trial."

Inasmuch as the attorney was r... employed by Mr. Farson, he readil... ised that he would not charge the c... a cent. Then the poor man stepp... ward to pay the costs and laid a $... on the magistrate's desk.

The court nearly fell off its chair ... astonished spectators crowded ar... gaze at the money.

While a constable was running ... Oak Park trying to get the bill ' ... the attorney slipped away and rett... Chicago, where he said to Mr. Far...

"Before I put up another tear ... for a poor man I'm going to make ... he has some small change in his pc...

VEHICLES AND PARTS.

)hio Automobile Company's Model G.

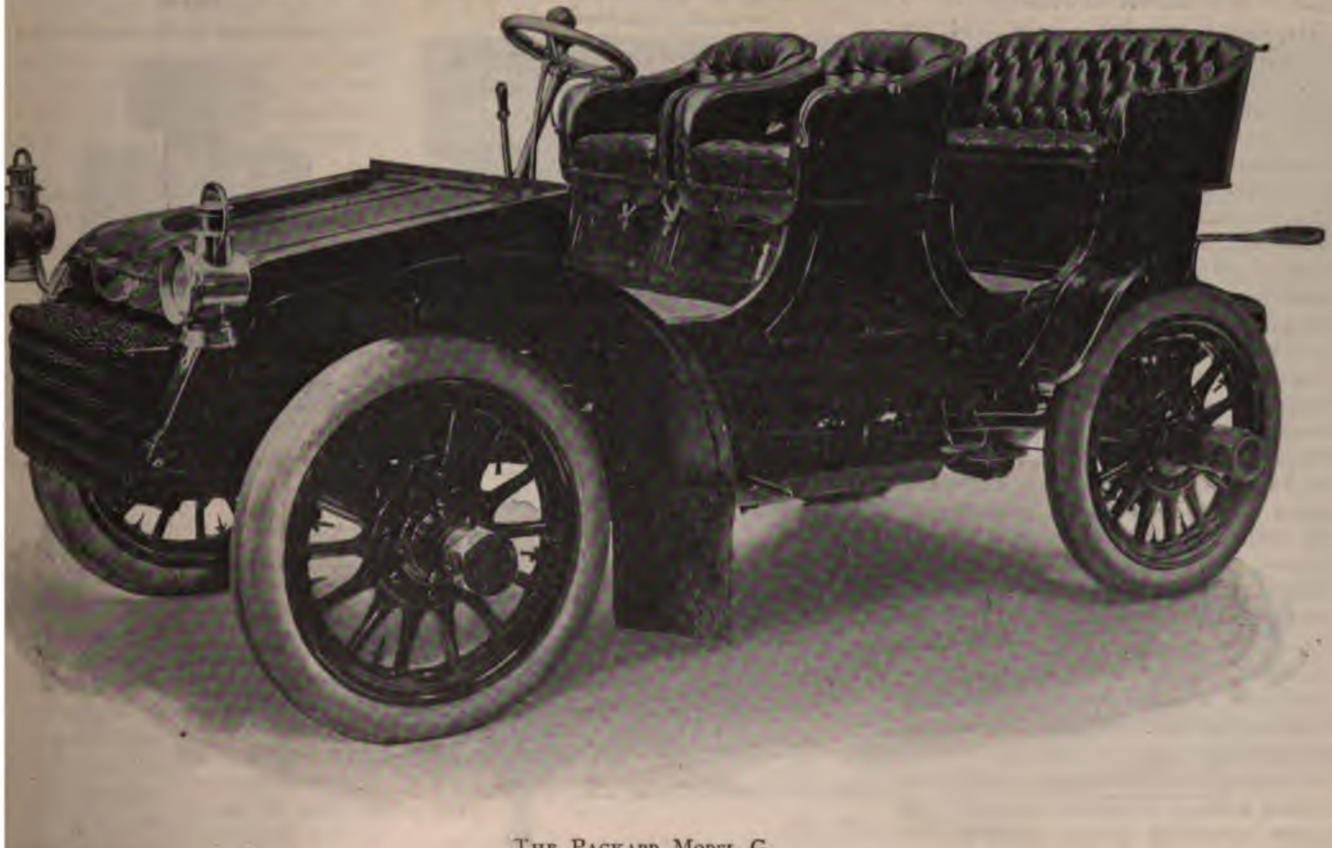
atest product of the Ohio Automo- npany, Warren, Ohio, is the "Pack- odel G touring car. The accompa- alf tone illustrates this vehicle. The has a detachable rear seat, and it is with the purchaser to order either :au attachment or the rear seat, nakes a surrey of the machine.

:arriage has a wheel base of 7 feet :s and a standard tread. The are larger than those of the well C and F models, being 36 inches in r and having tires of a cross sec- liameter of 4½ inches. The latter odrich clincher tubes. There are ı spokes to each wheel. The front run on ball bearings of the Ameri- ll Bearing Company's design. The iw of balls revolve in the same plane el revolves in. Near the cap of the a row of small balls which guide › but do not carry the load. The heels are keyed to the shafts that hem. The rear axle bearings are under the spring saddles and are the ball type. The frame is built hannel steel and rests on semi-ellip- ngs in front and full elliptics in the ll of them are 40 inches long. The have five leaves and are 2 inches ınd the latter have nine leaves and the same width. The employment of liptics in front in place of an inverted elliptic spring constitutes a departure in "Packard" construction. To obtain a boot of considerable depth it was necessary to resort to this practice.

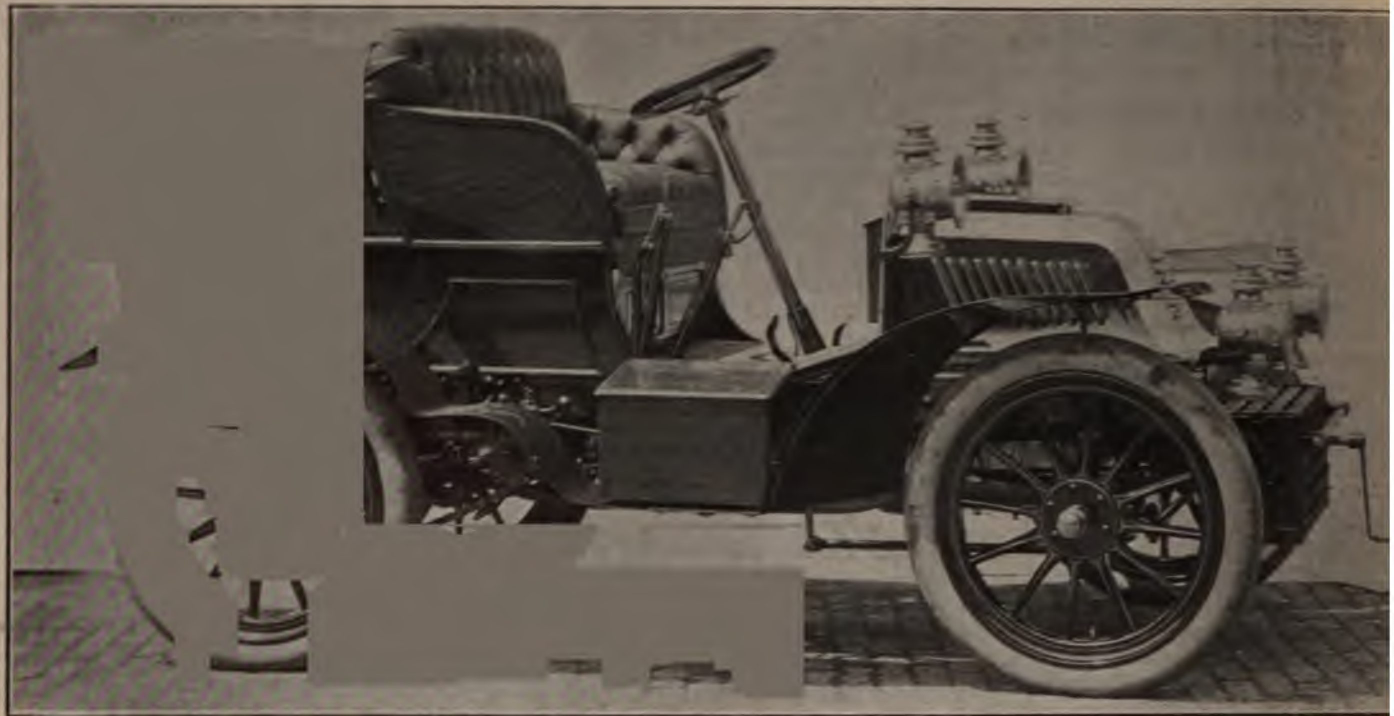
The car is propelled by a horizontal, opposed double cylinder engine of 24 horse power, which is located under the body. The crank shaft is parallel with the axles, the cylinders are located on the left side of the centre line of the vehicle, and the fly-wheel is located on the right hand side. The variable speed gear, which is of the sliding type, is under the operator's seat and gives three forward and a reverse speed. A heavy roller chain "connects up" the secondary change speed shaft with the differential. Each cylinder of the engine has a separate carburetor, and the timing of the spark is done by a centrifugal governor, which revolves with the cam shaft and shifts the two ignition cams. The latter are secured to a sleeve driven by a feather key in the shaft. A change has been made in the design of the governor. In the older models there is a casting of the shape of an 8. It is secured to a sleeve on the cam shaft and has a link which runs from it to the ignition cam. A coiled extension spring is employed to resist the action of the governor. In the improved type there are two weights pivoted at one end and connected by two links to the double cam. This governor is built on the principle of the Porter steam engine governor. The ignition is by jump spark. A three cell storage battery in the front boot furnishes the current to the igniters. In case this battery gives out the four (Columbia) dry cells may be called on. Each cylinder has its separate spark coil. The tank capacity of the carriage is ample. There are two water tanks under the main seats, which hold approximately 4 gallons each. One of the gasoline tanks is located under the boot and the other below the body at the extreme rear. A tube connects these tanks and a stop cock is provided to enable the engine to draw from the supply in one tank at a time or from both together at the same time, at the will of the operator. Forced water circulation is employed. The radiator consists of brass header castings and twenty-four tubes in six by four rows. The radiating disks are of copper and are of the circular, fluted type. The distance between the heads is about 31 inches.

The fenders are of aluminum, 13 inches wide in front and 9 inches wide in the rear. The brake on the differential drum is applied by a foot pedal; the one on the secondary change speed shaft is actuated by the clutch lever. The latter brake is double acting, which is another departure in "Packard" design.

In front individual seats are attached to the body. Each of them is 17 inches deep and 17 inches wide. The rear seat is large enough for three passengers—19 inches deep and 42 inches wide. The cushions and lazy backs are upholstered in tufted leather. There are two pockets in the linings of each forward seat, which are suitable for carrying maps or small articles. Over one-half the space in the boot and all the space under the rear seat is available for carrying luggage. To afford the passengers additional comfort the footboards are inclined. If a tonneau is substituted for the present rear seat the total carrying capacity is eight persons.



THE PACKARD MODEL G.



THE FOURNIER-SEARCHMONT TYPE VI.

The Searchmont Type VI.

The car illustrated herewith is the latest production of the Fournier-Searchmont Company, and is fitted with their 8 horse power double cylinder, vertical motor in front, the same as their Type V, which has been on the market during the last season. The company furnish us the following description:

The vehicle is an improvement over the Type V in a number of respects.

The motor now has a solid head, the water joint having been dispensed with; also, an improved valve, etc. It has three speeds forward and reverse, the third speed being so arranged that it gives a direct drive from motor to compensating gear, no intervening gears being in operation. This arrangement materially reduces both friction and noise.

The entire car is elegantly finished and luxuriously upholstered, the detachable tonneau being especially roomy and comfortable. The car is fitted with four brakes, two of them on the countershaft being operated with the right pedal, and two on the rear wheels being operated with a hand lever. The emergency brake also automatically throws out the clutch, so that if it is necessary to bring the car to a sudden stop all that needs be done is to throw this lever forward.

Two sets of batteries are furnished with each car, which in the French fashion are in a box on the right step, and are very convenient. Both sets are wired and connected with a switch, so that one set can be thrown off and the other on without the operator leaving his seat.

A cooling coil is hung in front of the car, and positive circulation is assured by a gear circulating pump. Another improved feature is the mechanical oiler which automatically and positively oils the engine and driving mechanism of the car.

The gasoline and sparking levers are on the steering post immediately under the wheel, and can be operated without removing the hand from the wheel. A button is also attached to the left side of the wheel, convenient to the thumb, the bare pressing of which shuts off the current and consequently the power. The clutch lever is operated by the left foot.

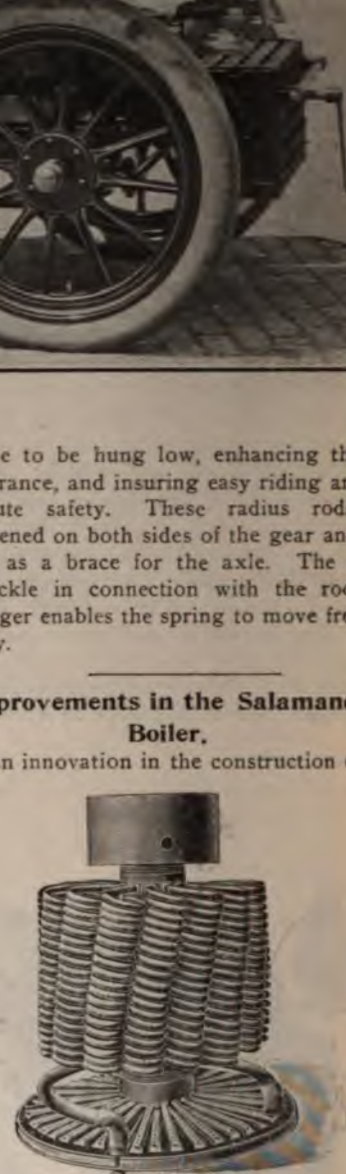
Brecht's Combination Spring Hanger, Radius Rod and Swing Shackle.

The accompanying cut shows the combination spring hanger, radius rod and swing shackle of the Brecht Automobile Company, St. Louis. The motor equipment may be fastened anywhere on the angle iron frame in front of the axle, with chains running from the sprocket on the axle to the transmission gear of the engine. The chain which usually becomes slack and runs off the sprockets, by the movement of the vehicle springs, is always kept in proper tension with this device, it is claimed. The above combination spring hanger and radius rod permits the use of semi-elliptic springs, which allow the vehicle to be hung low, enhancing the pearance, and insuring easy riding and solute safety. These radius rods fastened on both sides of the gear and act as a brace for the axle. The sw shackle in connection with the rod hanger enables the spring to move free easy.

BRECHT COMBINATION HANGER.

Improvements in the Salamandr Boiler.

An innovation in the construction of



NEW SALAMANDRINE BOILER.

Salamandrine boiler is that the inner c are now canted slightly, instead of be aranged vertically heretofore. By means, it is clain the gases and he products of coml tion are better to attack the st generating surfac the coils, and that result shows abou per cent. increa steaming efficien

The Fredonia Automobile.

The Fredonia Gasoline Carriage.

The Fredonia Automobile Company, of Youngstown, Ohio, have brought out a very neat looking gasoline runabout of substantial construction, which is herewith illustrated. Unlike most vehicles of this type, the Fredonia has wooden wheels of the Sarven pattern (Phineas Jones), 32 inches in diameter, with 3 inch pneumatic tires. Timken roller bearings are used in front and standard roller bearings in the rear. The axles are of solid steel, 1¼ inches in front and 1½ inches in the rear. The body is supported on four oil tempered elliptic springs, 30x1⅜ inches, and the frame is constructed of 3 inch channel steel.

The engine is a single cylinder horizontal one, 5½x6½ inches, with cylinder and head cast integral to avoid the packed joint. The engine has an aluminum crank case, bronze bearings throughout and a 22 inch flywheel weighing 160 pounds. Jump spark ignition is used. A special Upton transmission gear is used, which is inclosed in an oil tight aluminum case and is operated by a single lever. A 1¼x½ Diamond chain transmits the power to a Brown-Lipe differential gear on the rear axle.

One oil and three grease cups are provided for the lubrication. The bearings using grease are provided with pockets carrying about ½ ounce of grease. It is claimed that on account of this the cups need to be screwed down only once in every 100 miles or more, and that no other parts need attention as regards their lubrication, except the roller bearings, which have to be looked to every three months.

The sprockets have 9 and 23 teeth respectively, which, in combination with the engine control, give speeds from 4 to 30 miles an hour.

The tanks are of coppered steel; the steering is of the side lever variety, and for circulating and cooling the cooling water a Lobee pump and a radiator comprising sixteen 28 inch tubes with aluminum disks are provided. Dow combination batteries are used for ignition, and a double acting brake on the rear axle constitutes the required stopping appliance, in addition to the reverse of the transmission. The carriage is upholstered with red or green hand buffed morocco leather and the body is painted black with gold leaf stripe, and the gear carmine with black and gold stripe.

The total weight is 1,100 pounds.

It is said that the company is making arrangements for agencies in several of the large cities. The machine is claimed to have been thoroughly tested out, and to have among other feats accomplished the ascent of the Phelps street hill in Youngstown—17 per cent,—with two passengers and a trip of 148 miles, from Youngstown to Redbrook, Geneva, and back.

The New Crestmobile.

The Crest Manufacturing Company, of Cambridgeport, Mass., are now introducing a new design of gasoline runabout, which is to meet a demand from some of their customers who prefer an automobile body design to a box body type.

The motor and carburetor are arranged on the front axle, which has the advantage of rendering access to these parts easy as well as to expose the motor to the cooling breezes stirred up by the vehicle's motion. Further, the weight on the wheels is more evenly divided, which minimizes the wear of the tires.

The transmission gear is located below the body on the reaches, and the transmission gear shafts are supported in spherical bearings to allow for a displacement of the bearings in going over obstructions. The power of the motor is transmitted by chain

The New Crestmobile.

to the transmission and compensating gears.

The motor is of 3½ horse power, and the weight of the vehicle is 500 pounds. The motor is started by means of a strap on which the operator pulls while seated in the carriage. The control of speed and the stopping of the motor are effected by a single handle controlled by the right hand. The change from high to low speed is made by means of one movement of the clutch handle, and the carburetor adjustment is effected by means of a small handle on top of the steering column.

The manufacturers make the following claims for this machine:

The Crestmobile has a long wheel base, which means easy steering and comfort to the user. The seat has a high back with good width. The trimmings and finish of the carriage are of the best. The tank, coil and battery are placed under the seat. The box in the curved dash is used for tools, rubber boot, etc. As no weight of machinery is supported by the body the springs are light and flexible, insuring easy riding. A double acting foot brake is used. The body of the carriage not being filled with machinery has space for goods, wraps, etc. Also the machinery on the running gear increases the stability.

The Toledo Three Cylinder Motor.

The motor of the new Toledo touring car is of the three cylinder vertical type mounted in front under a cast aluminum bonnet. This motor is said to be of 16 brake horse power, each of the three cylinders being of 4¼ inch bore and 5¼ inch stroke. The three cylinders are cast integral or in a single casting of best gray iron. The combustion chamber and valve chamber for each cylinder are also cast integral. A soft copper gasket is fitted in the joint between the combustion chambers and the cylinders, thus forming absolutely tight joints. The cylinder walls and combustion and valve chambers are water jacketed.

The crank case is cast of aluminum in two halves, the upper half carrying the motor supporting brackets and the shaft bearings. The cylinders are bolted to this casting in the usual manner. The lower half of the crank case may be removed should occasion require without disturbing any of the working parts of the motor. This portion of the crank case forms an oil reservoir into which the cranks dip, and in this way the crank bearings and connecting rod bearings are lubricated. The cranks are set at 120 degrees and the shaft is forged of a single piece of "car axle steel." After turning it up it is hardened and ground on centres.

The shaft is mounted in adjustable bronze bearings, four in number. The cam shaft which operates not only the exhaust valves but the inlet valves as well is driven from a bronze pinion on the engine shaft meshing with a bronze gear keyed to the cam shaft. The cam shaft is also lubricated on the "splash" principle from the crank chamber of the motor.

The connecting rods are drop forged. The pistons, cast in gray iron, each have two ring grooves of double width, and each groove carries two rings. The cylinders are bored and then "lapped" out, thus insuring a perfect internal surface. The inlet and exhaust valves are turned from forged nickel steel blanks. A screw plug covers each valve, removing which the valves are readily accessible. A single float feed carburetor of large size supplies the three cylinders through an ample three way induction pipe. The carburetor is attached to the motor and forms an integral part of it. A simple centrifugal governor controls the speed of the motor on the throttling principle. The action of this governor is prevented by a small foot pedal or "accelerator." When this pedal is depressed the speed of the motor is entirely controlled by a lever operating the spark timing arrangement. The ignition plugs are located directly over the centres of the pistons. A very heavy flywheel forms the fixed clutch member, according to usual practice.

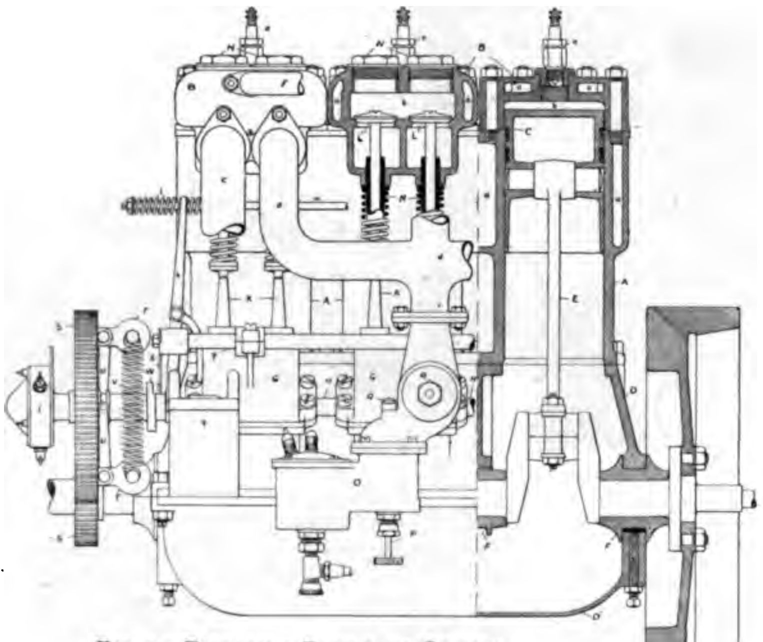


FIG. 1.—ELEVATION PARTLY IN SECTION.

A A A, cylinders; a a a, water jackets; B B, valve chambers; b b, compression spaces; C, piston; c, exhaust pipe; D¹, lower half crank case; d d, inlet tubes; E, connecting rod; e e e, ignition plugs; F F, crank boxes; f, water tube; G G, cam shaft cases; g, supporting bracket; H H, cam shaft; i, circuit breaker; K K, valve lifters; L, inlet valve; L¹, exhaust valve; l, counteracting spring; M M, valve guides; m, throttle governor connecting link; N N, valve covers; O, carburetor; P, carburetor regulating screw; Q, mixture valve lever; R, throttle valve chamber; S, motor shaft pinion; S¹, cam shaft gear; T T, governor; U U, governor arms; V, governor spring; W, throttle cam; X, rock shaft arm; Y, rock shaft.

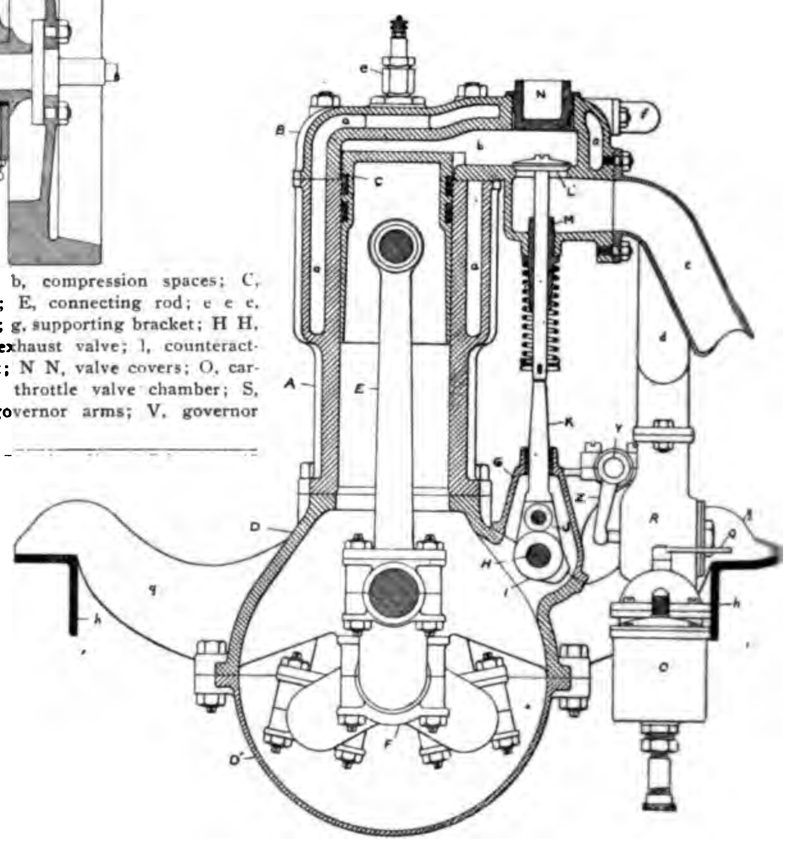


FIG. 2.—SECTION THROUGH CYLINDER AND VALVE BOX.

MINOR MENTION

In Savannah, Ga., over thirty automobiles are owned now.

Bloomington, Ill. (20,000 inhabitants) has eight automobiles.

There is to be an automobile floral parade at Washington, D. C., on October 6, on the occasion of the G. A. R. encampment.

An automobile 'bus line is proposed for San José, Cal., to run on Empire street, that city. C. A. Brown is the promoter.

The Long Island Highway Protective Society is reported as the latest effort to subdue road scorching by united action.

The Motor Cycle Manufacturing Company, of Brockton, Mass., have reduced the price on their Marsh motor bicycle to $130.

There were to be an automobile exhibition and races at the Worcester (Mass.) Agricultural Society's fair on September 1 and 2.

The report that an advance in the price of the Oldsmobile runabout would take effect this fall has been authoritatively denied at this time.

Lofton E. Johnson, of Cleveland, and L. E. Rouse, an Englishman, are making a trip from New York to Cleveland in a Winton touring car.

E. J. Hodgson, an architect of Minneapolis, has applied for a patent on an automatic speed indicating and registering device for automobiles.

Members of the Automobile Club of Rhode Island were the guests of the Massachusetts Automobile Club at their clubhouse on Saturday, August 23.

A locomobile is said to have won the King Alphonso prize in a recent 10 mile race at Madrid, Spain, and to have defeated several gasoline cars in the event.

It is stated in newspaper reports that an electric vehicle, equipped with a set of the new Edison storage battery, will be entered in the A. C. A.'s 500 mile endurance contest.

Work at the plant of the Waltham Manufacturing Company was resumed on August 25 after a week's rest. During the vacation considerable new machinery was installed.

Gabriel, the French racer, reduced the world's kilometre record to 26 2-5 seconds at Trouville on August 26 in a Mors machine. This time corresponds to 84 miles an hour.

The Atlantic City and Pleasantville Land Company have been incorporated in Trenton, N. J., with $50,000 capital, to deal in lands and buildings, and to manufacture automobiles.

The record for a 1,000 mile motor cycle ride is said to be held by "Rainmaker" Hansen, his time for the distance being seventy-two hours and twenty-six minutes. John Nilsson, of Minneapolis, who made an atempt to lower this record, was compelled August 19 to abandon the task owing to heavy rains.

The Fredonia Manufacturing Company, of Youngstown, Ohio, are placing upon the market a gasoline carriage with a single cylinder engine, 5½x6½ inches, the design of C. F. Gaither.

The Automobile Club of California has issued a circular to its members, advising them to observe the rules of the road and to show courtesy and consideration to horse drivers met with.

The Board of Freeholders of Warren County, New Jersey, has passed resolutions fixing the speed of automobiles in the county at 15 miles an hour, and at 5 miles an hour when passing another vehicle.

Twelve manufacturers of solid rubber tires have agreed upon a standard channel for such tires, and the American Steel Hoop Company, of Pittsburg, are now making the steel rolls for turning out this channel.

The Durabile is the name of a new gasoline carriage to be put upon the market by the Amstutz-Osborn Company, of Cleveland. The company is now preparing plans for a factory on Case avenue, near the C. and P. tracks.

The liverymen of Stockton, Cal., have formed a union, and one of them raised the price for keeping and boarding the city patrol wagon horses $60 per month. The city authorities are thinking of acquiring an automobile patrol.

W. C. Keller has succeeded in reorganizing a Washington automobile company, which will be reincorporated soon with a capitalization of $100,000. Associated with Mr. Keller are R. H. Shindel, a York (Pa.) banker, and A. L. Kline, a Washington capitalist.

The Automobile Line, which crosses Eads Bridge, St. Louis, again seeks to prevent the East St. Louis Street Railway Company from connecting its tracks with those of the bridge car line for a through service. An injunction was applied for August 20.

The Automobile Company, of Washington, D. C., was incorporated in Camden, N. J., August 25. The company will manufacture and deal in autos. The incorporators, W. C. Koller, A. L. Cline, R. H. Shindel and W. B. Wolcott, have capitalized it at $100,000.

We have received from Emil Spielvogel, 315 East Sixty-fifth street, New York, a colored print, 19x26 inches, entitled "The First Automobile Passing Through a Dutch Village," after a painting by H. Cassiers. The print, we believe, is intended for poster purposes.

The Konigslow Automobile Company, Cleveland, have completed their experimental machine, and have given it some very hard usage on the road to discover any weak points that may exist. So far the machine is said to have proven very successful over all kinds of roads.

During his recent visit to London the Shah of Persia bought six automobiles, each of 12 horse power, roofed and convertible into a close carriage. Each car has seating accommodations for eight persons. Two of the vehicles are to be sent to Persia immediately with engineers who have been engaged for them.

The American Motor Carriage Company, Cleveland, have made application for reorganization to increase their capital to $500,000. Ten machines are completed, and fifty more rigs are in course of construction. The company will rebuild their factory and increase their equipment so as to compete for 1903 business.

The Hartford Automobile and Livery Company, Incorporated, has just been organized with a capital of $60,000, under the incorporation laws of Connecticut. F. C. Rockwell is president; Mr. Dart, of the West End Land Company, is secretary, and Edward F. Alvord is treasurer. The main office of the company will be at Hartford, and a New Haven branch will be under the management of A. E. Bradley.

The Automobile Club of Kansas City had a meeting at the Baltimore Hotel on August 27. An invitation was received from Manager Guthrie, of the Atchison Corn Carnival, to participate in an auto assembly, to be held in that town September 24 and 25. Clubs from Kansas City, Leavenworth, Topeka and St. Joseph will take part in this, which is expected to be the greatest gathering of autos ever seen in that part.

Ferry Troubles.

Automobilists of New York who wish to reach the Hudson County boulevard, New Jersey, usually go by way of the Forty-second street ferry. Complaints have lately been made about the conditions existing at the ferry slip on the New York side.

Excepting when the tide is high, they say, the floating bridge is never lowered to the level of the boat floor, and in consequence many hundreds of dollars' damage has resulted to motor vehicles.

The rise from the boat floor to the bridge level, they aver, is often 18 inches or more, and as many low built automobiles have but 8 or 10 inches space between their flywheels and the ground it is obvious that some damage must be done in surmounting such an obstacle. Within a few days several foreign built machines are said to have been damaged to the extent of more than $1,000 in the aggregate.

The case was cited recently by an automobilist of a single vehicle that had its flywheel wrecked and gearing injured to an extent that cost $400 in repairs. A Panhard automobile that was sold not long ago for $15,000 is said to have been injured almost to as great an extent.

All the boats used in the ferry service at West Forty-second street, however, are not built so low, and from some it is possible to make the landing at low tide without damage.

Legislative and Legal.

Stewart Fulmer, of New York city, and Harry W. Welles, of Passaic, N. J., were arrested in Brooklyn on August 23 while returning from the Brighton Beach races for racing on Bedford avenue. Magistrate Naumer the next day suspended sentence.

The park board of St. Paul, Minn., on August 18 decided that hereafter the park superintendent is to be the sole judge of the extent to which automobiles can be used in the parks. Certain regulations will be framed governing the speed of the autos and the boulevards upon which they may be used.

The Evanston (Ill.) police have decided to give automobilists the benefit of 3 miles an hour to the speed allowed by the ordinances of the city, and will arrest no chauffeurs hereafter who are driving their machines at a speed not to exceed 11 miles.

When suspending sentence in a case for violation of the 8 mile speed limit, Judge Murphy, in Buffalo, on August 21, said: "In the near future the common council of this city may adopt a faster speed limit, and I hope it does, for 8 miles an hour is too slow."

The ordinance committee of Danville, Ill., has decided that automobiles may run 8 miles an hour in daytime and must slow down to 6 miles at night.

Automobile Accidents.

A five year old girl was run over and killed by an electric cab in New York last week. It appears from the testimony of the driver that she ran from the curb directly in front of the vehicle.

On August 23 a machine occupied by J. A. Hands and J. F. Merk ran into an obstruction just outside the Brighton Beach track, and the two men were thrown out, Mr. Hands breaking an arm.

While practicing on the Brighton Beach track on the morning of the races, H. C. Smith got too near the fence with his Winton machine and struck a post with rather bad results to both fence and vehicle.

Mr. and Mrs. John Mills, of St. David's, Pa., were thrown from their automobile while passing through Bryn Mawr on August 23, and were badly injured. While the machine was ascending a grade, with Mrs. Mills in charge of the levers, a chain broke and the auto came to a stop with a jerk sufficiently abrupt to unseat the two occupants, and both were thrown violently into the road.

A touring car occupied by Dr. A. A. Webber and S. C. Blaisdell, of Brooklyn, came to grief at Lynbrook, L. I., on August 24. It was being driven at a high speed when, to avoid a horse vehicle suddenly looming up, the driver turned out abruptly and ran the machine into the ditch. The two occupants were painfully injured and the machine badly wrecked.

KEROSENE NUMBER, MAY 28th,
Price Ten Cents.

Fatal Accident at Elberon, N. Y.

An automobile accident resulting in two deaths and injuries to two other occupants occurred at Elberon, N. J., at the Park Avenue Bridge over the New York and Long Branch Railroad on August 26. The vehicle was an imported Rochet-Schneider, and was driven at the time of the accident by the owner, Frank J. Matthews, a real estate man of Jersey City. It was further occupied by Mrs. Cobb and Mrs. Pizzini, relatives of the owner, the Rev. Patrick J. Grant and Rudolph Meyers, a chauffeur. The details of the accident are reported as follows:

A pedestrian was crossing the bridge which spans the railroad tracks, and was close to the end from which the automobile was approaching. There is an ascent to the bridge, and the power of the machine was turned on full to reach it. Mr. Matthews was at the lever, and turned the automobile to avoid hitting the pedestrian, who was knocked down when the machine shot by.

When Mr. Matthews turned aside he headed toward the rail at a rather sharp angle. Whether he shut off the power at the moment of turning or lost his head and neither applied the brakes nor shut off the power cannot be told. At any rate, it is thought that the distance was too short to stop in, and the heavy machine plunged against the railing. The impact caused the rail to give way, and the machine with four of its occupants dropped over the edge, a depth of 30 feet. The chauffeur, who was on the rumble, realized the danger the moment the swerve was made, and leaped when the machine hit the railing. He fell heavily, but beyond a shaking up and a few scratches escaped injury.

He explained the accident as follows: When Matthews swung to avoid the man ahead of him, his front wheels caught in the trolley rails and this prevented the automobile from straightening out again, and swung the rear of the machine forward along the course the machine had been taking. The forward part headed almost directly toward the rail. The power was shut off, and the brakes were under control, but not hard on. The impetus of the machine threw it against the railing, and, as the rear end swung around, it hit the man to avoid whom the turn was made. Except for the rail of the trolley road, the machine would have passed the man and continued across the bridge.

Mr. Matthews was instantly killed, and so was Mrs. Cobb. Mrs. Pizzini was badly injured, and the Rev. Patrick J. Grant, of the Paulist Fathers in New York, had a leg broken, and is suffering so much from shock that it is feared he may not recover.

This accident again is a result of the speed craze. It is reported that less than three hours before Matthews was arrested at Seabright for reckless speeding, and the judge when levying the fine had warned him that some day he might fall a victim to his recklessness.

List of Automobile Owners in the Office of the Secr of State at Albany

(Continued.)

Allen, Marcus C., Sandy Hill, N. Y.
Alden, Adelbert, Lawrence, N. Y.
Aspinwall, John, 290 Broadway, New Y
Andrus, W. L., Yonkers, N. Y.
Ayer, James C., 31 West Thirty-sixth York city.
Automobile Touring Company, 57 West street, New York city.
Argesinger, H., Johnstown, N. Y.
Arents, George, Jr., 111 Fifth avenue, city.
Aspinwall, John, Barrytown, N. Y.
Arents, George, Jr., 20 East Fifty-s New York city.
Adams, Roger C., Buffalo, N. Y.
Ams, Charles M., 372 Greenwich street city.
Arnold, Constable & Co., 115 Fifth a York city.
Adams, G. Elder, 50 West Sixty-ninth York city.
Arnold, Everett D., 166 Hawthorn a kers, N. Y.
Alvord, Dean, 1522 Albemarle road, Br York city.
Allen, A. H., Jr., Millbrook, N. Y.
Adams, Thomas D., Rochelle Park chelle, N. Y.
Ackerson, G. G., Hackensack, N. J.
Allen, William, Sprout Brook.
Angus, Mrs. George C., 401 Madison bany, N. Y.

Brown, E. H., 141 Broadway, New Yor
Bender, Chris. G., Rensselaer, N. Y.
Benton, M. F., 19 Central avenue, To N. Y.
Barrett, George E., 487 Bedford avenu New York city.
Bell, E. T., Paterson, N. J.
Bryan, H. R., Hudson, N. Y.
Barker, C. B., 18 West Sixty-first street city.
Blakeslee, William E., Hillburn, Rockl N. Y.
Briggs, Marvin, 128 Noble street, Bro York city.
Burt, H. R., 419 West 118th street, Ne
Benedict, Charles H., Schenectady, N.
Bright, O. W., 67 East Fifty-second York city.
Bosca, E. E. (with E. W. Heinman), nue, Brooklyn, New York city.
Boyd, Nathan, Brinckerhoffville, N. Y
Baumann, Dr. Louis, 250 Fifth street,
Bartley, John, 554 Summit avenue, Jers
Butler, William H., 9 West Twenty- New York city.
Bennett, C. A., Norwich, N. Y.
Brockman, George N., Cold Spring, N.
Bamberger, J. J., 93 Morningside a York city.
Brice, Lloyd S., Roslyn, L. I.
Buswell, Dr. H. C., 868 Main street, B
Bradley, Dr. A. E., Norwich, N. Y.
Bugbee, F. P., 626 West Thirty-ninth York city.
Burt, James D., Elmira, N. Y.
Bushinger, Edward, Utica, N. Y.
Benjamin, Eugene S., 1019 Madison a York city.
Beltshover, M. S., Ardsley on Hudson,
Baruch, Bernard M., 351 West Eighty- New York city.
Belfield, T. D., 33 Pine street, New Yo
Bollas, Thomas W., 111 Court street New York city.
Benedict, Walter H. J., 215 Monta Brooklyn, New York city.
Bidwell, Clinton, Prudential Buildin N. Y.
Berrick, John Y., 1151 Main street, Bu
Brady, E. L., 52 Linwood avenue, Buff
Bennett, E. H., 149 Broadway, New Yo
Bullinger, E. W., 53 Park place, New
Bodenstein, J. G., Staatsburgh.
Bryant, W. H., 22 Clinton street, Sarat N. Y.
Buchanan, Archibald, 128 Third street,
Bloomingdale, L. M., 11 East Sixty-se New York city.
Bruce, Leslie C., 211 Speir avenue, N. J
Brown, T. M., 59 Midwood street, Bro York city.
Butler, E. H., 522 Delaware avenue, Bu

Childs, William, 33 Charlotte street, U
Coca-Cola Company, 63 South Washin New York city.
Church, Frederick Y., 508 Wilder Buil ester, N. Y.
Connor, Dr. Henry R., 256 West street, New York city.
Collier, William M., Auburn, N. Y.
Chapin, C. W., 1 Broadway, New York
Colby, Ed. A., 408 New Jersey Railr Newark, N. J.
Connett, E. R., 16 Washington place, city.

Consolidated Gas Company, 4 Irving place, New York city.
Costigan, Thomas, 329 Amsterdam avenue, New York city.
Cermatte, F. F., 104 West Eighty-seventh street, New York city.
Cutler, J. G., Cutler Building, Rochester, N. Y.
Cutting, John S., 120 Desbrosses street, New York city.
Campbell, John S., 5 West 119th street, New York city.
Cook, T. A., Calicoon Depot, N. Y.
Cantor, Jacob A., 9 West Seventieth street, New York city.
Christianson, Benjamin E., 38 West Twenty-second street, New York city.
Clapp, Henry C., Waverly, N. J.
Cryer, T. B., 249 High street, Newark, N. J.
Curtis, R. B., 42 Park avenue, Mount Vernon, N. Y.
Comstock, Ira M., New York Mills, N. Y.
Conners, W. J., 250 Main street, Buffalo, N. Y.
Card, George, Poughkeepsie, N. Y.
Cousins, J., Sr., 275 Clinton avenue, Brooklyn, New York city.
Cousins, A. S., Jr., 27 Maple avenue, Clifton, L. I.
Cammann, E. C., 57 Liberty street, New York city.
Carpenter, Prof. R. C., Ithaca, N. Y.
Cohn, Arthur L., 40 Exchange place, New York city.
Crawford, John, Jr., West New Brighton, N. Y.
Casper, Y. L., Howe's Cave, N. Y.

Dickson, Joseph B., 43 Fifth avenue, New York city.
Dowdney, Daniel J., 253 East Sixty-first street, New York city.
Dunne, A. G., Fort Plain, N. Y.
De Graff, Howard A., Fonda, N. Y.
Dow, Alex., 47 West Forty-third street, New York city.
Dunbar, H. T., 1100 D. S. M. Building, Buffalo, N. Y.
Dawborn, Dr. R. H. M., 105 West Seventy-fourth street, New York city.
Debucker, Robert R., 317 East Seventeenth street, New York city.
Darron, Stewart, Owego, N. Y.
Dounce, F. N., Elmira, N. Y.
Darron, A. K., Corfu, N. Y.
Donaldson, J. A., 220 Depew avenue, Buffalo, N. Y.
Dodge, M. F., 315 West Eighty-first street, New York city.
Duncan, Mrs. Dora, 329 West Eighty-second street, New York city.
Dahe, Charles M., 58 Rhode Island avenue, Buffalo, N. Y.

Eirick, L. M., 243 Norwood avenue, Buffalo, N. Y.
Ellison, C. E., 33 West Ninety-first street, New York city.
Erstein, Leopold, 63 East Sixty-sixth street, New York city.
Egbert, John T., Ithaca, N. Y.
Dixon, Ellis W., 11 Broadway, New York city.
Elkins, S. B., Jr., 28 West Thirty-third street, New York city.
Edson, Herman A., 126 Liberty street, New York city.
Estabrook, William B., Ithaca, N. Y.
Englebret, Fred., 99 Sherman place, Jersey City.
Ebberts, J., 233 Anderson place, Brooklyn, New York city.
Emary, W. T., 61 Walker street, New York city.

Fisher, W. H., M. D., 410 South Main street, Elmira, N. Y.
Florence, James M., 226 West 138th street, New York city.
Fletcher, W. H., 136 Twelfth avenue, Paterson, N. J.
Fell, J. P., 340 West Delavan street, Buffalo, N. Y.
Finneaul, T. N., 20 Portsmouth Terminal, Rochester, N. Y.
Fischer, E. C., Gowanda, N. Y.
Froment, Eugene M. C., 151 Bank street, New York city.
Fenn, Bradley W., 154 Rutgers street, Rochester, N. Y.
Fairchild, W. L., 49 West Twenty-eighth street, New York city.
Fuller, George L., 3 Kirkland street, Utica, N. Y.
Friese, H. A., 1 Maiden lane, New York city.
Fisk, William J., 115 North Fourteenth street, Orange, N. J.
Fowler, F. C., 504 North Aurora street, Ithaca, N. Y.
Fraley, Tracy C., Elmira, N. Y.
Fellows, George P., Fort Plain, N. Y.
Feusterer, G. A., M. D., Floral Park, N. Y.
Fowler, Dr. R. S., 301 DeKalb avenue, Brooklyn, New York city.
Frost, Charles E., 156 Fair street, Paterson, N. J.
Frost, Frank, 29 Mercer street, New York city.

Gray, C. W., Watertown, N. Y.
Gartner, Alfred, Paterson, N. J.
Gibson, Walter S., 70 East Eleventh street, New York city.
Gifford, Arthur, Hudson, N. Y.
Gallatin, Goelet, 62 Cedar street, New York city.
Gillette, N. H., Cortland, N. Y.
Gebhard, F., 20 Broad street, New York city.
Galbraith, W. L., 127 West Ninety-third street, New York city.
George, Robert L., New Lisbon, N. Y.
Gardiner, Harry S., 16 Starrie street, Amsterdam, N. Y.
Griswold, Henry, 70 West Forty-eighth street, New York city.
Gunther, F. W., 43 West Seventy-third street, New York city.
Gutchess, H. C., Port Byron, N. Y.
Greenhut, B. J., 36 West Seventy-second street, New York city.
Guggenheimer, Meyer, 36 West Seventy-seventh street, New York city.
Griffin, Nathan D., Gloversville, N. Y.
Guthrie, W. D., 40 Wall street, New York city.
Gould, Helen M., Tarrytown, N. Y.
Greene, Henry E., Amsterdam, N. Y.
Garfield, Dr. R. M., Worcester, Mass.
Greenman, H. M., Bridgeport, Conn.
Gallatin, R. H., 438 Madison avenue, New York city.
Gaskin, Edw., 516 Norwood avenue, Buffalo, N. Y.
Ganson, Mrs. Charles F., 675 Delaware avenue, Buffalo, N. Y.
Gallatin, Albert, 670 Madison avenue, New York city.
Griffith, L. W., Palmyra, N. Y.
Gardenier, S. C., Newark, N. Y.
Gould, C. A., 61 Hamilton street, Newark, N. J.
Gage, William M., United States Hotel, Saratoga Springs, N. Y.

Handel, Louis, 1060 Halsey street, Brooklyn, New York city.
Hopkins, F. T., 37 Great Jones street, New York city.
Hewitt, Erskine, 9 Lexington avenue, New York city.
Hulberg, Frederick, 265 West 125th street, New York city.
Hall, E. F., 469 Virginia street, Buffalo, N. Y.
Holliday, Read, 47 Brevoort place, Brooklyn, New York city.
Haskins, Charles H., 70 Linwood street, Buffalo, N. Y.
Horton, Cornelius J., 1 Washington avenue, White Plains, N. Y.
Hortog, Albert, Grand View, N. Y.
Huyler, John S., 64 Irving place, New York city.
Haskins, John B., 2014 Seventh avenue, New York city.
Hawrer, Charles B., Milford, N. J.
Hoffman, Charles B., Red Hook, N. Y.
Hungerford, V. T., Hoffman House, New York city.
Hutchess, L. C., Hempstead, L. I.
Hochhauser, Herman T., 445 Atlantic avenue, Brooklyn, New York.
Holmes, W. K., 10 Regent place, Brooklyn, New York city.
Hopkins, L. N., 31 North Main street, Cortland, N. Y.
Haselton, J. S., Rome, N. Y.
Hoyt, Gordon W., 204 Marshall street, Syracuse, N. Y.
Howell, T. F., 654 Madison avenue, Albany, N. Y.
Hedenberg, G. E., 70 North Eighteenth street, East Orange, N. J.
Heilbron, Theodore, 33 Third avenue, Brooklyn, New York city.
Hobbs, Charles B., 58 Pine street, New York city.
Hawley, E. S., 25 Broad street, New York city.
Haight, Theodore S., Ballston Spa, N. Y.
Harmon, W. E., 219 Berkeley place, Brooklyn, New York city.
Hogan, Percy F., 243 Pearl street, New York city.
Heymenbourg, C. E., Dunkirk, N. Y.
Harden, F. B., Philmont.
Higgins, Harry J., Millbrook.
Hoffman, Gustav, 240 Sixth avenue, New York city.
Harrington, Dr. A. B., 34 Lenox road, Brooklyn, New York city.
Hamilton, Douglass, 1006 East 106th street, New York city.
Heft, G. Stanley, Bridgeport, Conn.
Higgins, Howard, 401 Marion street, Brooklyn, New York city.
Hanford, Solomon, 40 Wall street, New York city.
Hoyt, Gerald L., 24 Exchange place, New York city.
Haskins, C. D., G. E. Company, Schenectady, N. Y.
Hadley, Charles H., M. D., 55 New Utrecht avenue, Brooklyn, New York city.

Irwin, Theo., Jr., County Club, Syracuse, N. Y.

Jackson, John C., Fort Plain, N. Y.
Johnston, Dr. A. M., 102 West Seventy-fifth street, New York city.
Jackson, W. K., 413 Hodge avenue, Buffalo, N. Y.
Johnston, Harold E., Ithaca, N. Y.
Joseph, Leonard, 80 Broadway, New York city.

Kilmer, Nelson H., Ocean Grove, N. J.
Kloetzer, V. H., 34 Sumner avenue, Brooklyn, New York city.
King, Maud B., Rome, N. Y.
Kingsley, Willey L., Rome, N. Y.
Kelsey, W. W., Cortland, N. Y.
Keith, Edward A., 1 West 102d street, New York city.
Keasby, W. P., M. D., Perth Amboy, N. J.
Knowlton, R. T., 10 Clinton street, Brooklyn, New York city.
Keep, O. H., Jr., 131 West Thirty-first street, New York city.
Kershe, Henry A., Schenectady, N. Y.
Klotten, Albert R., 7 James street, Cortland, N. Y.
Kinney, C. L., Cortland, N. Y.
Koppelmann, Eugene, 1331 Franklin avenue, New York city.
Lipptrott, Richard N., Broadway and Driggs avenue, Brooklyn, New York city.
Le Feure, Dr. C. H., 665 St. Mark's avenue, Brooklyn, New York city.
Lee, Charles H., Oneida, N. Y.
La Shelle, Kirke, 1402 Broadway, New York city.
Lewis, George W. T., M. D., 318 Ashland avenue, Buffalo, N. Y.
Lewengood, S., 138 West Seventy-eighth street, New York city.
Levey, F. H., 59 Beekman street, New York city.
Lang, Percy L., Waverley, N. J.
Loeffler, August, Stapleton, S. I.
Laidlaw, Charles E., 49 West Eighty-fifth street, New York city.
Levermore, J. R., 36 West Forty-sixth street, New York city.
Liptrott, W. E., 29 West Forty-second street, New York city.
Long, B. G., M. D., 520 Elmwood street, Buffalo, N. Y.
Lewis, Harold L., 138 West Eighty-seventh street, New York city.

Monell, F. B., 31 Broadway, New York city.
Manhattan Fire Notification Company, 111 East Thirteenth street, New York city.
Monahan, Thomas, Jr., 370 Pearl street, New York city.
Montgomery, George T., 316 West Eighty-third street, New York city.
Manning, R. F., 40 John street, New York city.
Morris, Frank, 653 Fulton street, New York city.
Martin, Henry G. T., 41 Union square, New York city.
Muller, R. J., Germania Bank Building, New York city.
Merriam, Newton, Amsterdam, N. Y.
Murray, F. J., 321 West Seventy-fourth street, New York city.
Morse, William, 72 Reade street, Hackensack, N. J.
Masury, John, 2 West Seventy-first street, New York city.
Martin, P. E., 93 South Pearl street, Albany, N. Y.
Moss, Fred., 326 West Eighty-fifth street, New York city.
Morgan, John Hill, 7 Pierrepont street, Brooklyn, New York city.
Matthews, H. E., M. D., 12 Hillside avenue, Orange, N. J.
Mora, S. H., 439 Lake avenue, Rochester, N. Y.
Moss, Dr. Frank W., 104 Main street, Elmira, N. Y.
Moore, Wilson H., Brockport, N. Y.
Morris, Harry S., 32 Broadway, New York city.
Mosher, B. D., M. D., Granville.
Masury, F. L. M., 43 West Eighty-seventh street, New York city.
Milter, Frank, 230 Main street, Elmira, N. Y.
Michaels, E. H., Philmont.
Myers, Theo. V., 21 West Forty-sixth street, New York city.
Miller, William, 385 Third street, Brooklyn, New York city.
MacCormac, Paul, Poughkeepsie, N. Y.
McLaughlin, A. W., 128 Broadway, New York city.
McKennon, L. E., 326 Richmond avenue, Buffalo, N. Y.
McLoughlin, Charles, 5 East 126th street, New York city.
McLarvey, Archie, 513 Western avenue, Albany, N. Y.
McLarvey, Alden, Thurlow Terrace, Albany, N. Y.

Nash, E. W., 110 Central Park West, New York city.
Noyes, Garrett P., 224 Jay street, Albany, N. Y.
Norwood, Holmes M., 816 Genesee avenue, Brooklyn, New York city.
Norris, E. A., 323 Central avenue, Albany, N. Y.
Nollman, L. A., 108 Garfield place, Brooklyn, New York city.
Newbold, Thomas, Hyde Park, N. Y.
Norris, Charles H., Port Chester, N. Y.

Offerman, John, 29 Broadway, New York city.
Oppenheimer, Dr. S., 706 Madison avenue, New York city.
Osgood, Charles, 349 West Fifty-eighth street, New York city.
Osborn, E. W., 3 Grange place, Rochester, N. Y.
O'Donohue, C. A., 88 Front street, New York city.
Orr, John C., 122 East Seventy-second street, New York city.
Oppenheimer, David E., 56 East Sixty-sixth street, New York city.

Piel, M., 118 Lefferts place, Brooklyn, New York city.
Post, George A., Paterson, N. J.
Prince, J. D., 31 West Thirty-eighth street, New York city.
Pell, Clarence C., Tuxedo Park, N. Y.
Pifford, Henry G., M. D., 256 West Fifty-seventh street, New York city.
Pond, Edwin W., Walton, Delaware County, N. Y.
Potter, Henry Noel, New Rochelle, N. Y.
Powers, J. Craig, 292 East avenue, Rochester, N. Y.
Pellinger, George, Weehawken, N. J.
Page, Charles M., 318 Madison avenue, Albany, N. Y.
Phillips, M. H., 170 Broadway, New York city.
Probst, John, 660 Bedford avenue, Brooklyn, New York city.
Potter, H. C., M. D., Mannsville, N. Y.
Parkhurst, Mira E., Canastota, N. Y.
Peets, E. T., 169 West Ninety-fourth street, New York city.

Potter, J. W., M. D., 806 Fillmore avenue, Buffalo, N. Y.
Peck, C. C. W., 277 Broadway, New York city.
Perry, Oliver H., Newtown, Elmhurst.
Pray, Albert G., North Clove.
Prohan, Louis B., 130 Pearl street, Brooklyn, New York city.
Pien, Max V., 93 St. John's place, Brooklyn, New York city.
Pancoast, George E., 805 President street, Brooklyn, New York city.
Pierce, Norman M., 88 Chestnut street, Binghamton, N. Y.
Picken, George F., 56 West 113th street, New York city.

Randall, E. C., 626 West Ferry street, Buffalo, N. Y.
Ruhl, Henry C., M. D., 673 East 138th street, New York city.
Robbins, F. E., 102 West Water street, Elmira, N. Y.
Root, Reuben M., 40 Krettner street, Buffalo, N. Y.
Ray, Frank, Waldorf-Astoria, New York city.
Rau, Alfred M., 115 Broadway, New York city.
Randall, Garret, Hackensack, N. J.
Root, F. J., Binghamton, N. Y.
Ramage, Laurence A., 54 Wall street, New York city.
Rees, Fred. H., 612 West Church street, Elmira, N. Y.

Saks, H. A., 40 West Thirty-fourth street, New York city.
Schermerhorn, N. J., 11 North Church street, Schenectady, N. Y.
Scribner, Charles, Paterson, N. J.
Snow, E. G., M. D., 57 West Seventy-fifth street, New York city.
Sternberg, Edwin, M. D., 43 East Sixtieth street, New York city.
Swarthout, J. E., 20 Caldwell avenue, Elmira, N. Y.
Sherman, W. W., 838 Fifth avenue, New York city.
Stoltze, August, 537 Bedford avenue, Brooklyn, New York city.
Stone, Thomas, 357 West Twenty-seventh street, New York city.
Siepermann, Max, 57 Greene street, New York city.
Sibley, Hiram W., 214 East avenue, Rochester, N. Y.
Siegel, Henry, 822 Broadway, New York city.
Schwab, C. M., 71 Broadway, New York city.
Smith, L. L., Waldorf-Astoria, New York city.
Stone, A. J., 204 Central Park West, New York city.
Sutro, Lionel, 375 Irving place, Portchester, N. Y.
Stanton, Gerald N., 66 West Forty-sixth street, New York city.
Stoney, Henry, Cherry Hill, N. J.
Smith, John C., 29 West Sixty-ninth street, New York city.
Spencer, S., 29 West Seventy-third street, New York city.
Syms, Dr. Parker, 50 West Forty-seventh street, New York city.
Stuart, Clarence D., Amsterdam, N. Y.
Steel, R. W., 4433 Pine street, Philadelphia, Pa.
Swain, Charles J., 4501 Spruce street, Philadelphia, Pa.
Snedeker, C. D., Perth Amboy, N. J.
Skelly, Hugh P., 646 First avenue, New York city.
Schlan, Richard, M. D., Union, N. J.
Schuttleworth, Ed., East 105th street and East River, New York city.
Sweet, V. C., State Institute, Syracuse, N. Y.
Smylie, Charles A., 140 West Fifty-eighth street, New York city.
Smith, J. Clinch, Westbury, L. I.
Smith, Edw., 78 State street, Albany, N. Y.
Skinner, Charles E., 3 Nepperhan street, Yonkers, N. Y.
Smith, Harry J., 69 Genesee street, Utica, N. Y.
Schieren, H. V., 405 Clinton street, Brooklyn, New York city.
Smith, Samuel C., Canastota, N. Y.
Sullivan, M. J., 30 Park place, Brooklyn, New York city.
Shirley, W. M., Geneseo, N. Y.
Swayne, Alfred H., 650 Madison street, Brooklyn, New York city.
Suydam, Walter L., Blue Point.
Silverthorne, W. E., North Tonawanda, N. Y.

Tuttle, Stella S., Canastota, N. Y.
Taylor, B. C., 784 Fifth avenue, New York city.
Tatum, A. H., 126 East Sixtieth street, New York city.
Turton, John K., 676 Sterling place, Brooklyn, New York city.
Tuttle, Henry G., 1141 East Thirty-seventh street, New York city.
Trowbridge, Grosvenor R., M. D., 1331 Main street, Buffalo, N. Y.
Thoneson, F. Du P., 338 Summer street, Buffalo, N. Y.
Trover, Dr. W. E., Red Hook, N. Y.
Tower, J. T., Tuxedo, N. Y.
Taylor, James R., 42 Park avenue, Mount Vernon, N. Y.
Tabor, Leroy, Elmira, N. Y.
Tolles, Brainard, 32 Nassau street, New York city.
Tefft, John, Mechanicsville, N. Y.
Taintor, C. D., Port Richmond, Staten Island, N. Y.
Thomson, G. Rugge, Glens Falls, N. Y.
Turch Company, W. J., Kingston, N. Y.
Traub, William T., 3698 Southern boulevard, Bedford Park, New York city.
Terrell, W. H., South Orange, N. J.

Voorhees, George A., Canandaigua, N. Y.
Van Allen, D. S., 98 First street, Albany, N. Y.
Van Loon, Dr. J. C. P., 346 West Thirty-third street, New York city.
Vogel, Joseph, 17 South Hamilton street, Poughkeepsie, N. Y.
Van Nest, G. Willett, 123 East Fifty-eighth street, New York city.
Von Bonnewitz, Dr. O. R., 143 West 122d street, New York city.
Vosburg, Roydon, Skaneateles, N. Y.

Wyman, John E., 110 Central Park West, New York city.
Washburn, Louis F., 14 Ellis avenue, Ossining, N. Y.
Werner, Joseph A., 175 Sackman street, Brooklyn, New York city.
Wilkens, Ernest, M. D., 284 Alexander avenue, New York city.
Wood, John L., 20 Broad street, New York city.
White, William Cravath, Scarsdale, N. Y.
Whitehead, V. L., 507 Porter avenue, Buffalo, N. Y.
Winter, Dr. H. K., 734 Flushing avenue, Brooklyn, New York city.
Whittemore, Louis H., Fishkill on Hudson, N. Y.
Watson, James S., 11 Prince street, Rochester, N. Y.
Watson, James W., Greenwich, N. Y.
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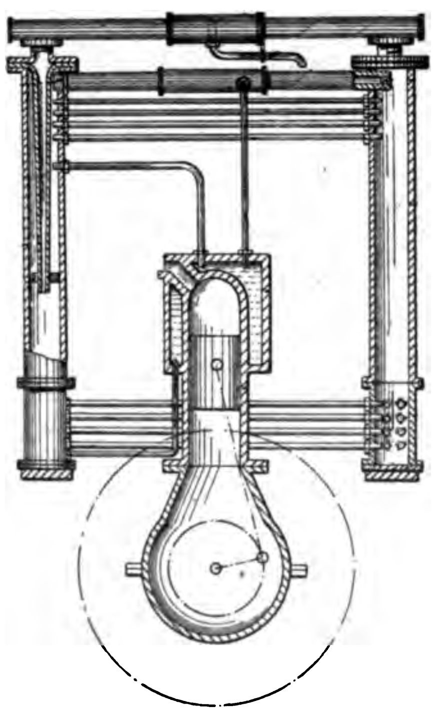
(To be continued.)

MOTOR VEHICLE PATENTS..

United States Patents.

707,570. Water Cooling and Circulating Apparatus for Explosion Engines.—Ernest Eastcourt, of South Hampstead, London, England. August 26, 1802. Filed January 22, 1900.

The invention comprises water circulating apparatus for explosion engines, comprising a series of water circulating pipes above and below the cylinder jacket opening into upright conduits one of which is blocked, a transverse conduit connecting the upper ends of the upright conduits and having a funnel tube on one end passing into the lower part of the blocked upright conduit, with means for allowing the escape of surplus water and generated steam and for trapping the water carried by the steam.



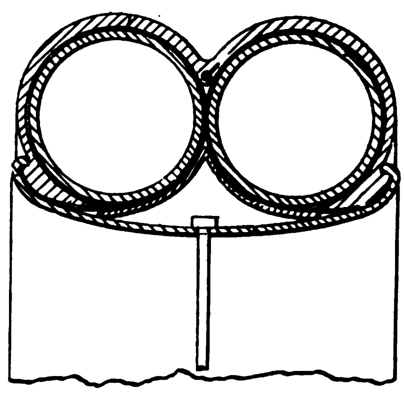
No. 707,570.

707,647. Telescopic Compound Engine.—William Schneider, of Chicago, Ill. August 26, 1902. Filed March 23, 1901.

The drawing shows the improvements in their application to a twin telescope compound locomobile engine, the reciprocating high pressure piston cylinders of which are connected to one and the same crank shaft, which latter is to be geared to the driving axle of the vehicle by sprocket and chain gearing. The engine seems rather complicated compared to the ordinary marine type.

707,661. Pneumatic Tire.—Moritz Weiss, of Vienna, Austria-Hungary. August 26, 1902. Filed May 14, 1902.

The present invention relates to an improved arrangement of pneumatic tires for automobiles, which is claimed to entirely prevent the lateral sliding of the wheel



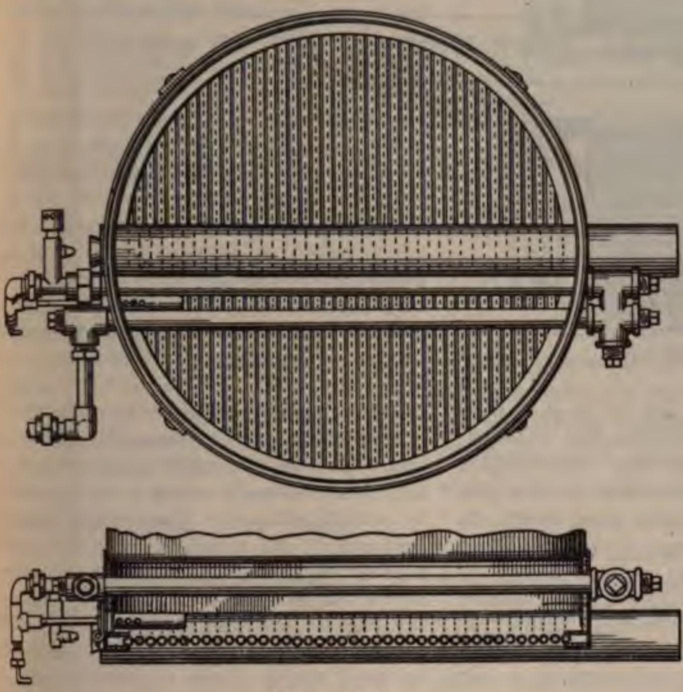
No. 707,661.

even when the tire is completely pumped up and impart to the wheel an increased stability without increasing its rolling friction. This tire is provided with two air tubes aranged symmetrically to the middle plane of the wheel and surrounded by one common cover. The cover is provided on the middle of its interior surface with two flaps forming prolongations of the fabric which serves as backing for the cover, the flaps being laid around the interior part of the air tube and the free edges of the flaps being introduced and clamped between the wheel rim and the fixing flanges of the tire cover. In this manner the cover is drawn into the space between the two air tubes, and consequently when the vehicle is driven it is in contact with the ground simultaneously on two separate places arranged symmetrically to the middle plane of the wheel.

707,852. Igniting Device for Hydrocarbon Burners.—George Lane, of Poughkeepsie, N. Y. August 26, 1902. Filed February 8, 1902.

The object sought to be obtained by this

invention is that the ignition device shall be so located as regards the burner that the air used by it to support combustion shall be derived wholly from within the casing in which the burner is located and, further, shall be so located as regards the burner and its casing that once ignited it



No. 707,852.

will remain burning and will not be extinguished by the air currents or eddies which commonly exist in the vicinity of a hydrocarbon burner.

Referring to the drawing the burner is surrounded by a casing, the interior of which forms a combustion chamber over the burner. Supported within the casing and in proximity to the burner are two vaporizing tubes. The vaporizing tubes are connected at one end to a source of fuel and at the other end to an injector device arranged in front of the mixing tube of the burner.

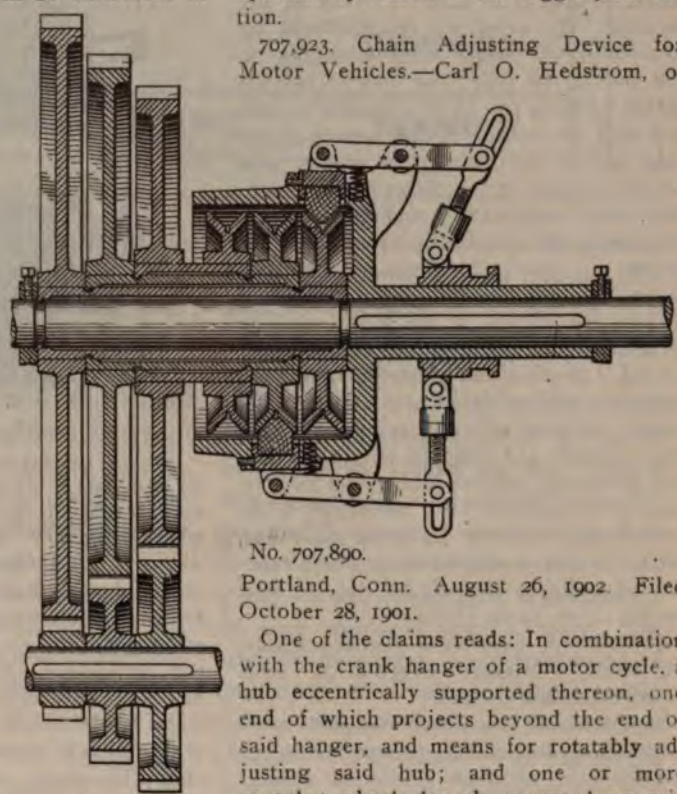
The igniting device consists of a tube, having a screw thread on its outer end by means of which it is connected to a plate, detachably attached, by means of screws, to the exterior of the casing. The igniter tube has formed in it near its outer end, but within the cavity of the casing, a series of openings, through which the heated air from the interior of the casing may find entrance into the burner tube. Fuel is fed into the tube by means of the pipe connected at one end to the fuel supply, through the vaporizing tubes. The other end has formed through it a small perforation.

It will be observed from the construction described that the igniting device forms a Bunsen burner, and by reason of its location within the cavity of the casing the air used to support combustion will be warm air and drawn from the interior of the casing with the result that the flame produced by the igniting device will be a sharp blue flame of considerable intensity. It will also be noted that by reason of the location of the igniting device and the fact that the air supply openings are wholly within the casing it will be unaffected in operation by air currents or eddies occurring external to the burner casing.

707,890. Variable Speed Clutch.—William A. Wood, of Ansonia, Conn. August 26, 1902. Filed November 22, 1901.

As shown in the drawing, the device consists of three pairs of spur gears on parallel shafts. The three gear wheels are provided with hubs or hollow shafts extending far out to one side and the three hollow shafts are mounted concentric with each other and with the shaft of the gears. Upon each one of the hollow shafts is mounted a peripherally grooved disk serving for friction clutch purposes. The three disks are surrounded by a drum keyed to the inner, or solid shaft. In the periphery of this drum are arranged sliding pieces provided with wood blocks adapted to engage the grooved surface of the disks. By means of a sliding collar and a set of toggle mechanisms the three wood blocks can be made successively to engage their respective disks and thus clutch them to the shaft.

The advantages of the invention comprise the compactness of the structure and the ease with which a number of varying speeds may be obtained by one continuous motion of the lever. Also it may be noted that in passing from the highest to the lowest speed the intermediate speed clutch must be temporarily thrown in, and thereby acting as a brake to gradually reduce the speed the shock which would otherwise result from immediate transfer from the highest to the lowest speed is avoided. The parts are all readily adjustable, so as to insure the firm gripping of the clutches, and great pressure between the parts is secured with little effort of the operator by reason of the toggle joint action.



No. 707,890.

707,923. Chain Adjusting Device for Motor Vehicles.—Carl O. Hedstrom, of Portland, Conn. August 26, 1902. Filed October 28, 1901.

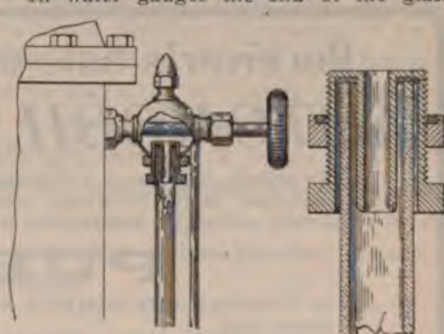
One of the claims reads: In combination with the crank hanger of a motor cycle, a hub eccentrically supported thereon, one end of which projects beyond the end of said hanger, and means for rotatably adjusting said hub; and one or more sprocket wheels loosely mounted on said projecting end of the hub.

707,931. Steam Generator.—W. A. Kitts, Sr., and W. A. Kitts, Jr., of Oswego, N. Y. August 26, 1902. Filed March 22, 1902.

This steam generator comprises a water containing shell having inlet and outlet passages and provided with a series of upright transverse partitions dividing the shell into a series of compartments. Each partition has a passage connecting adjacent compartments. A series of tubes project from the opposite walls of the shell and have their inner ends aligned with the partitions and communicating with adjacent compartments and their outer ends closed.

707,943. Water Gauge for Steam Boilers.—David W. Rockwell, of Brockton, Mass. August 26, 1902. Filed December 17, 1901.

In water gauges the end of the glass



No. 707,943.

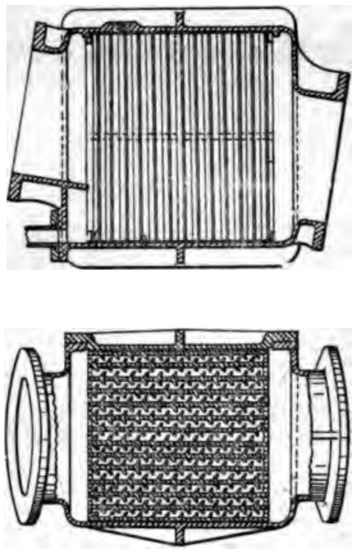
gauge tube is usually closely confined within the socket or coupling by which it is at-

tached to the valve casing or steam arm which enters the water column and is directly exposed to the steam, which acts chemically on the glass and eats or cuts it away at this point, rendering it thin and weak, so that it is liable to break at any moment. To overcome this difficulty by preventing the steam from impinging on the end of the tube, and also to provide means whereby the air is permitted to contact with the outside of that portion of the tube within the coupling or socket, thus keeping it cool, is the object of this invention, which consists in a coupling or socket provided with a chamber of sufficient diameter to receive the end of the glass gauge tube and leave an open air space all around the outside of the same, whereby it is kept cool, the chamber being tightly closed at its inner end to exclude the steam therefrom and provided with a steam inlet nozzle or tube centrally arranged within the chamber and adapted to project into the glass tube, whereby the steam as it issues in a small jet from the nozzle is directed away from the end of the glass tube, which is thus prevented from being eaten or cut away in grooves by the chemical action of the steam thereon.

707,728. Oil Separator.—Richard Schulz, of Berlin, Germany. August 26, 1902. Filed September 7, 1901.

Refers to oil separators designed to be placed in steam conduits to separate the oil contained in the steam during its passage through the conduit, and has for its object to provide an economical, easily removable, and adjustable separator effective in its operation.

The device consists of a casing provided with an inlet and an outlet steam union, by means of which it is inserted in the steam pipe. The casing is provided with a movable cover at one side, and has at its lower portion an outlet pipe. The casing has a slightly larger cross section than that of the steam pipe or passage, and is arranged to have inserted in it a series of plates, each provided with inclined ribs on each side, said ribs being arranged to loosely interfit with those on the adjoining plate, so as to provide a tortuous or zigzag passage for the steam between the plates. These ribs are inclined toward the incoming steam, and the friction of the steam against the plates and ribs will cause the



No. 707,728.

oil to adhere to them and run down toward the bottom of the rectangular chamber, where, together with any condensation water, it can be drawn off through a pipe provided with a suitable stop cock. As shown, the plates are somewhat inclined and are normal to the inclined bottom of the rectangular chamber. The chamber has its lower end somewhat below the steam outlet union, and below this union at the lowest point enters the draw off pipe. The plates are suitably spaced from one another in any desirable manner, as by means of spacing beads formed on the plates and by varying the spacing between the plates, a greater or less number of these can be inserted, thereby providing a larger or smaller friction surface. The entire series of plates are held in position between a lid and a wall of the casing opposite to the lid. By reason of the ribs being inclined in the direction of the incoming steam they form substantially separating pockets, causing the eddying of the steam and effective separation of the oil and the priming water, if any.

707,752. Manufacture of Sheets of Flexible Elastic Material, Which Cannot Be Readily Punctured.—Victor E. Belledin, of Paris, France. August 26, 1902. Filed March 20, 1901.

This invention relates to the manufacture of sheets of flexible elastic material which cannot be readily punctured, and is therefore especially suitable for the protection of the inner tubes of double tube pneumatic tires.

In carrying out the invention the hide of any horned cattle may be employed. The hide is first washed and dehaired. It is then immersed for from two to twenty-four hours in a bath of cold crude petroleum and then from four to twelve hours in a bath of a suitable mineral or fatty oil. After removal from the latter bath it is permitted to dry—that is to say, the excess of oil is permitted to evaporate from the hide. In case the hide is not sufficiently thick for the purpose in view and it is desired to thicken the same, this step is now accomplished by immersing the hide for about twenty minutes in a bath of potassium silicate or sodium silicate having a strength of about 33° Baumé, and the same is then permitted to dry. The next step, either in case the hide has or has not been subjected to the treatment for thickening, is that of cutting the same into sheets of approximately the width of the tread of the tire to be made, which is accomplished by suitable knives. Each sheet is then subjected to the action of a convex roller passing longitudinally of the sheet, which action causes the same to curl or curve transversely and longitudinally. After the sheet has been thus rolled it is immersed for from six to twelve hours in a bath of benzine, whereby it is hardened. It is then removed and dipped in a bath of chloride of lime of from 33° to 50° Baumé in order to close the pores and sterilize the hide, and is then permitted to dry. When dried it is ready to be applied in the manufacture of the tire.

The tire is composed of three principal parts—an inner air tight expansible air tube, an outer cover or sheath, known as the "outer" tube and commonly formed of canvas or other flexible non-expansible web and india rubber and being cut open at its inner periphery for receiving the inner tube or pneumatic, together with this improved protecting sheet, prepared as described.

The protecting sheet of hide is immersed in a solution of caoutchouc in benzine or bisulphide of carbon. This causes it to adhere to the tire cover and renders it capable of being vulcanized to the cover.

Receiver's Sale of Entire Property and Plant, Complete, of

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By order of the Court of Chancery of New Jersey the entire property of the Automobile Company of America, including lands, buildings, machinery, fixtures, tools, stock, manufactured and unmanufactured, choses in action, and rights and credits, will be exposed to sale at

PUBLIC AUCTION

on MONDAY, SEPTEMBER 8, 1902, 11 A. M., on the premises, corner Westside Avenue and Broadway, Marion, Jersey City, N. J.
Permits to inspect the property must be obtained from the Master under whose supervision the sale will be made, at his office. Descriptive circulars will be sent on application.

CHARLES L. CARRICK, Special Master in Chancery,
15 Exchange Place, Jersey City.

HENRY C. CRYDER,
Receiver.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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"Automobile Accidents."

It has been intimated in certain trade circles that we are hurting the automobile industry by publishing accounts of accidents.

The harm which is done the industry is the result of the accidents themselves—not of their being recorded by us—and the responsibility rests upon those through whose negligence, mistakes or excesses the accidents are caused. As perhaps 90 per cent. of all accidents so far have been due to reckless speeding, a large share of the blame for the harm done the industry rests upon those who by word or action have encouraged such speeding.

Some of the recent accidents have been of so serious a character that their injurious effects could not be reduced by ignoring them, even if a self respecting publication purporting to print the news of the movement could conscientiously pass over occurrences of such importance.

Accidents are a stern reality that must be faced by the automobile industry. The important question is not how to keep the public ignorant of them, but how to prevent their recurrence in the future, and our object in publishing accounts of accidents, besides meeting our obligations toward our subscribers, is to point out the causes and to thereby suggest means of avoiding such accidents in the future.

The automobile will have to stand upon its own merits, which in our opinion it is perfectly capable of doing. The motor vehicle industry is not an *affaire Panama*—a conspiracy of press and promoter to defraud the public.

A publication which stakes its existence on the suppression of news can never have the confidence of the public, a prime essential in any legitimate newspaper undertaking. THE HORSELESS AGE *has* the confidence of the public, and we are determined that it shall retain it, regardless of those who think their interests demand that the public be kept in ignorance. "Aiding the industry" by the suppression or perversion of the truth as embodied in legitimate news we shall in the future as in the past leave to those whose journalistic "accomplishments" are chiefly in such directions.

Some Recent "Revolutionary" Automobile Inventions.

The last few years in the automobile movement have been marked by continuous and substantial progress in mechanical construction, and a gradual disappearance from the field of the universal inventive genius who proposed to solve the automobile problem along radically different lines from those followed so far. Lately, however, several of these wonder workers have been heard from again.

For the last few weeks the New York dailies have printed accounts of experiments with an alleged new fuel "created from various hydrocarbons and chemicals," the chief advantage of which is claimed to be that it is absolutely safe to handle and is only one-half as expensive as gasoline for the same amount of power obtained. The inventors have taken an old gasoline driven quadricycle, have removed the gasoline tank and substituted therefor another tank, charged, so it is claimed, with the alleged new fuel. They have jacked up the rear axle of the quadricycle, and for the edification of the reporters have given demonstrations of how the wheels could actually be revolved without the apparent use of gasoline.

Now, what is most peculiar is that anybody should be impressed with any such demonstration. The number of fuels actually known by which this might be accomplished is almost beyond enumeration, ranging from pure hydrogen to the most complex hydrocarbons. But what is the advantage of a new fuel which is known only to permit of driving the wheels of an automobile when they are raised clear off the ground? The chief points in connection with a new fuel for automobiles are those of cost, convenience and relative power and steadiness of running of the engine with them. None of these factors can be determined by running the wheels of a vehicle raised from the floor, and nothing definite can be known about the cost until something more is known about the composition of the fuel than that it is "created from various hydrocarbons and chemicals."

Another recent product of inventive genius in the automobile line is "an electric auto which is driven without batter-

ies." That none of our readers may get an idea that the machine is to be driven by the electricity of the air we hasten to explain that the electrical energy consumed by the motors is generated by a "small dynamo under the seat of the carriage," driven by a gasoline engine. The dynamo, the inventors explain, is really the flywheel of the engine, and the four wheels are in themselves electric motors—a remarkable simplification, it might appear, to the uninitiated. If only the inventors could have made the engine serve, say, as the seat for the occupants, they would have rendered the parts of an ordinary vehicle capable of propelling functions and thus struck out in a truly original direction in automobile design.

As it is, there is absolutely nothing original in the general idea, and, what is perhaps more, nothing practical from a commercial standpoint. A method of automobile propulsion by electric motors with current generated on the vehicle by a gasoline engine and dynamo was patented in England as far back as 1897. The use of the revolving part of the dynamo for flywheel purposes with engines used under such conditions was attempted in 1898 by two independently working American inventors, and the building of the motor into the wheels was embodied in electric vehicles exhibited by Lohner, of Vienna, at the Paris Exposition of 1900. In fact, the so called Mercedes-Lohner-Porsche vehicles repeatedly referred to in the automobile press recently embody every general feature of the vehicle proposed by these inventors, and, therefore, also all its intrinsic faults. What is the object of converting the mechanical energy generated by the gasoline motor first into electrical energy in the dynamo and then back into mechanical energy in the motor? The efficiency of transmission under such conditions, with the abnormally slow running wheel motors, could hardly be over 50 per cent. as compared with the 75 per cent. easily obtained when the power is transmitted directly (on the high gear) from the engine to the wheels, not to speak of the multiplication of machines and machine parts.

To Conciliate the Masses.

It was certainly a happy idea that in the Labor Day parade in New York city the labor leaders took part in automobiles. There has been altogether too much talk recently about the automobile being only a plaything of the rich, a fad that will soon pass away. The circulation of such notions, together with the uncivil behavior of many automobilists owning fast machines, has created prejudice and antagonism toward the automobile in the lower and middle classes, to the existence of which the experience of touring automobilists gives ample testimony.

It is not difficult to prove that this prejudice is entirely unfounded and that all classes will in the end be benefited by the automobile movement. So far, of course, the automobile has been confined to the wealthy classes, to a certain extent, but the fact that these classes have taken up the automobile with such enthusiasm is in itself very fortunate. It has made possible remarkably rapid progress in construction and reduction in price for equal value, thereby hastening the day when the automobile will be within the reach of a very much larger class of the population. Further, the automobile has long since passed the stage of a simple pleasure vehicle. The fact that hundreds of physicians throughout the country are at present using these vehicles in their regular practice directly disproves that they are only "the plaything of the rich." Besides, we hear of traveling salesmen, rural mail carriers, etc., adopting the automobile in their work.

Another point. It is probably a low estimate to say that at present at least 10,000 skilled workmen are employed in the manufacture, care and repair of automobiles, generally at good wages. If, then, the laboring classes have so far been unable to enjoy the advantages of automobile travel, they have indirectly profited by the movement, and have therefore in reality every reason to be kindly disposed toward it. Unfortunately, many of the newspapers circulating chiefly among the working classes try to make capital out of class hatred and lose no opportunity to hold up the automobile as a means of oppression of the poor by the wealthy. A counter campaign should be inaugurated to convince the masses that they too will be benefited by the advent of the automobile, as they have been benefited by all other mechanical developments that have preceded it. By participating in the parade in automobiles the labor leaders indirectly acknowledged this fact, while, on the other hand, "the nobility of labor" has never received more fitting recognition than on this occasion.

Improvement in Spring Suspension.

For good roads the conventional French method of running gear construction—supporting a rigid machinery frame on the axles by four semi-elliptic springs, without the use of reaches—presents a number of advantages. The body hangs low, the springs can be made long and flexible without being unduly heavy, and the front axle is securely held against longitudinal displacement without distance rods. On roads of great roughness, however, as well as at high speeds, the system is not so satisfactory, since it provides less flexibility and subjects the springs to abnormal stresses at times. For instance, when one wheel passes over a rock or other protuberance in the road, the spring near that wheel is subjected to a violent shock, if the vehicle is proceeding at considerable speed, and a breakage is not unlikely, unless the springs are exceptionally strong.

Relatively more attention has so far been given the motor and transmission than the running gear, and the result is that in many of the best developed cars at present the motor equipment is more reliable than the running gear or some of its parts, when touring on the average American roads is considered. Seldom is an extended tour made now that one of the sources of trouble is not broken springs. Of course, the high speeds usually attempted largely account for this.

Improvement in the line of spring suspension is therefore much to be desired. It would seem that a three point support for the body frame would constitute a great advance over the usual four point support, as it would allow the wheels to adapt themselves to uneven road surfaces without putting any strain on the springs. The change would be a parallel to that from the original rigid running gear to the flexible running gear, which change has proved so decided a success. This three point body support is now a feature of several American machines and is also being adopted abroad. It is especially to be recommended for American roads.

Racing in Club Runs.

For the afternoon of Wednesday, August 27, the Chicago Automobile Club had arranged an automobile club run to Crown Point, Ind., and back—one of those runs periodically held by all automobile clubs to do justice to the passage in their constitution stating the object of the club to be to further the cause of the automobile

hicago Club has been especially o boost the automobile business by ms; so much so that these runs be- e cause of their first president, who take kindly to the idea of serving dwich" man to the auto trade, as ressed himself, resigning from his

last run of this club was intended to ticularly effective in "furthering the of the automobile," and reporters he Chicago dailies had been invited ompany the procession, seats having rovided for them.

ehow the reporters got the impres- at it was to be demonstrated to them utomobilists are perfectly capable of lling themselves, as well as their nes, and running along at an easy, gulated pace, to which nobody could ly take objection. Such a demon- n would have been exceedingly , in view of the anti-speed legisla- in a number of Chicago suburban recently. How they got this idea e unable to say—whether they devel- it by the aid of their own reasoning ies or whether they were given to stand by the club officials that such he purpose of the run. At any rate ntentions of the organizers seem to been good, for otherwise they would y have invited any newspaper men.

, to quote the words of one of the ts, "things happened, and the pro- me was not carried out." Before the imits were passed the run had devel- into a race between drivers of fast g cars, and the participants became ted, the small machines being left ehind. Near Hammond one of the s went down an embankment into a pool of water, out of which it had towed by another machine. The e is said to have been proceeding at te of 38 miles an hour just before it down into the water, but it is not d out how the speed was measured. of the machines is said to have made n back from 4 miles beyond Ham- l, Ind., to the clubhouse—about 25 —in one hour.

mbers of the club would not admit there had been any racing along the , but admitted that the event had nstrated that in the future no chauf- should be permitted to pass the lead- ring runs, and that a fine should be sed on disregard of this rule; also, inexperienced chauffeurs should not itted to take part in such runs.

The facts above detailed throw perhaps some light on the anti-automobile sentiment in Chicago's suburbs.

Inaccurate Machine Work on Cylinders and Pistons.

By Albert L. Clough.

The writer has lately had the opportunity of examining the cylinder bores, rings and pistons on three horizontal gasoline vehicle engines manufactured by a concern of some prominence, which were in the shop for repairs. Two of the motors had been brought in on account of "congenital" and chronic weak compression, and one of them especially had given serious trouble on account of allowing the passage past the piston of a very detrimental amount of oil from the splash lubrication in the crank case, with the result of a very foul mixture and continual blackening of the plug, although it was claimed that an excessive amount of oil was never carried in the engine base, and that of high fire test. No one of the three engines had run its respective vehicle more than 1,000 miles. The cylinder bores of two of them were far from circular in section, and in one of them the piston was actually 3-64 inch smaller in places than the average cylinder diameter. The piston was worn bright only on the top and bottom, and not all the surface there showed wear. The sides were black with oil. The piston had thus never nearly filled the bore even when hot.

There is no doubt that a gas engine piston should not be a tight fit to its cylinder when cold, as it would then bind when hot, on account of the fact that the piston runs at a considerably higher temperature than the water cooled cylinder walls. In an engine of large bore this difference in expansion would amount to considerable, and this fact has been taken into account in the very large engines by circulating water through the piston itself. But in a vehicle engine of this comparatively small size, if the piston is made so as to be what a machinist would call a somewhat loose fit to its cylinder, the piston when expanded would fit very well. There can be very little excuse for such a lack of fit as above described, nor for lack of symmetry in the bore. The bores of these cylinders were not only sufficiently elliptical in section to be apparent when roughly tested by calipers, but the diameter varied along the length of the bore. Such defective mechanical work is often the result of faults in the machine tool upon which the boring is done. If the work is done upon a lathe by means of a boring bar held between the centres—the work being strapped to the carriage—there is a chance of making an elliptic bore unless the headstock bearings of the lathe are perfectly tight. In the ordinary use of a lathe, practically all the wear upon these bearings is in line with the tool pressure—that is, horizontal—and the headstock bearing thus wears more in a horizontal than in a vertical line. Anything which is held between centres then has more false motion horizontally than vertically, and a boring bar held in a worn out lathe would thus execute a bore with its smaller diameter horizontal and its larger diameter vertical, thus resulting in an elliptical cylinder. The piston turned up in the same lathe would be nearly true and the piston rings as well, and they would, theoretically at least, only touch the cylinder walls at two points. The ways of a lathe naturally become more worn in the centre of their length than near their ends, and this prevents a perfectly cylindrical bore of uniform calibre.

These cylinders were evidently bored upon a worn out lathe. Not only that, but one of the cylinders showed bad tool marks, which had not been obliterated by wear. The tool had evidently become dull and caught, digging into the cylinder wall. This was either on the finishing cut and the tool had been ground, reset and the boring continued, or else it was during one of the earlier cuts, and the finishing chip had been too fine to cover the defect. Some blow holes were also apparent in the walls of two of the cylinders.

The pistons of each of these engines were provided with three packing rings, but only one or two among them all showed contact throughout the entire length. They all bore hard enough at their ends and at one or two other portions, but very few of them showed wear over more than two-thirds or three-quarters of their entire circumference. There is no wonder that compression was weak and that there were lubrication troubles. The rings were evidently of the kind which are made by turning up a hollow cylinder with an external diameter about equal to the cylinder bore, cutting rings of the proper width off from this, splitting them and springing them into the grooves of the piston. Such rings tend to make contact at their ends and at a portion of the circumference nearly opposite where they are split. It is well known that rings should be made by turning out a hollow cylinder slightly larger than the engine cylinder bore, cutting off the ring blanks the desired width, placing several of them side by side within a cylindrical shell very slightly larger than the cylinder diameter, finishing their ends until they just come together and then clamping them by their sides on a jig by means of two side plates, after which the shell is removed and the rings are turned off to exactly the same diameter of the cylinder, and the tool marks ground off. The gentleman who owned one of these engines, upon complaining of his low compression to the manufacturer, was comforted by the assurance that the cylinder and rings would wear to a fit. But it seemed to him, as it seems to many another, that it was unfair to make the user attempt to do the work that ought to be done at the factory, and he has become pessimistic. People expect to wear down the tool marks by use, but not to

correct the work of machinists who ought to have been carpenters.

Some Further Notes on Lubrication.

By J. S. V. Bickford.

It will be noted that in the experiments described in my last article the bearing was loaded from below and the oil introduced from above. This is the correct method of lubricating a bearing, though this fact is sometimes forgotten. On the other hand, it is by no means an uncommon thing to see a bearing lubricated from the side at which the load is applied. Some time since a set of experiments were described in the *Engineer*, of London, giving the pressures registered by the oil in a bearing at all points of the surface. From these it became clear that the actual pressure under which the oil was kept at the point of application of the load was exactly the same as the load per square inch of the bearing. Thus, suppose the bearing to be 2 inches long by 2 inches diameter, there would be 4 square inches of bearing surface; and supposing the total load to be about 400 pounds there would be a load of 100 pounds per square inch. Under these conditions the experiment showed that the oil at the point of application of the load and in the middle of the length of the bearing was under a pressure of 100 pounds per square inch. This was measured by introducing a pressure gauge into a small hole drilled at the point at which the pressure was to be taken. As a natural corollary to this it might be supposed that if a bearing was loaded from one side and lubricated from the other by an oil bath and then a small hole drilled in the bearing on the load side the oil would flow from this hole. This is actually the case, the oil flowing slowly from such a hole until the resistance flow through the hole equals the pressure on the bearing.

LUBRICATION OF WRIST PINS.

I see in The Horseless Age of July 23 Mr. Meier describes an arrangement for lubricating wrist pins (sometimes called gudgeon pins) of single acting engines by means of a small funnel arrangement attached to the big end of the connecting rod and fitted with a small ball valve. The writer tried this arrangement about two years ago when this question came up for consideration, but did not proceed with the matter, as it was decided to use steel roller bearings in the wrist pin joint, which was possible in this case, as the engine was a steam engine with the thrust constantly in one direction and the motion so small that the noise was not considerable. In gasoline engines, however, the matter is much more important, and a few words will not be out of place. As far as is known to the writer the arrangement described by Mr. Meier in The Horseless Age of July 23 works all right in practice, but the writer has never actually given it a careful trial.

There are two other methods of lubricating wrist pins which are perfectly practicable.

(1) As pointed out above in the notes on journal friction the pressure of the lubricant in a bearing at the point of load is equal to the pressure on the bearing. If, therefore, a hole be drilled right up through the connecting rod from bearing to bearing the oil will be forced up through the connecting rod from the big end to the gudgeon pin, and if a small oil channel be formed in that bearing the oil will flow to the top of it and lubricate the pin. This method is only applicable to an engine having a constant thrust on the bearing.

(2) The writer is, however, inclined to favor another method as being t and less liable to get out of order

It will be noted that the crank wrist pin are always at the same from one another. If, therefore, pulley be attached to each of thes little belt passed around these pu tension will remain constant. Fu the engine works the belt wil around. As it dips into the oil crank chamber at each revolutior carry the oil very effectually to tl pin. A small wiper at the wrist insures the oil getting into the be

There is still another method v possible, if for any reason the oth ods cannot be used. If a pulley of a diameter as possible be fastened crank pin rigidly and a small pu fitted on to a pin set in the side connecting rod the small pulley w to scatter the oil in a thoroughly manner. For effective lubrication manner, however, it is necessary the top of the piston, as shown, small conical projection, which sh to drip the oil scattered on the i the piston on to the wrist pin j the piston have a flat surface, littl oil will get on to the wrist pin Fig. 2 shows the arrangement.

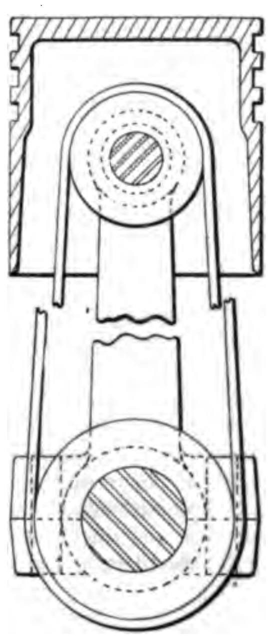


Fig. 1.

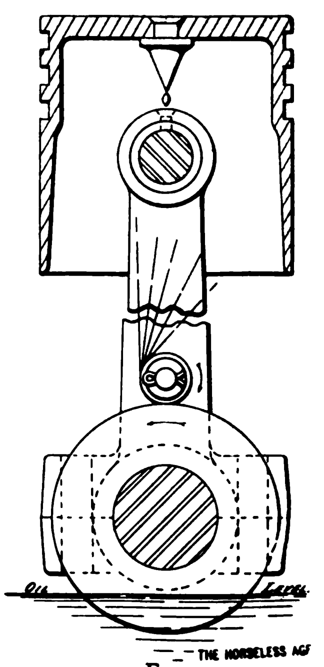


Fig. 2.

The Detroit Races.

The racing committee of the ass which will hold the Detroit races us that they have just decided on tl The races will occur September 19 on the Detroit driving track, w claimed to be the fastest automobi in the United States and is the which Alexander Winton broke a ing records up to 12 miles in th 1901. The management have dec seven races each day, together with speed trials against time. The pr a most complete one, and, inasr this meet will follow Cleveland, w curs on September 16, it is expec the attendance will be large. Entr can be obtained from William E. I chairman of the racing committee Jefferson avenue, Detroit, Mich prizes, it is said, will be valuable t There will be no entrance fee The entries close on the 18th for dicap events, while the entries f events close Friday morning, the

The events are as follows:

FRIDAY, SEPTEMBER 19.

No. 1—5 miles, steam, open to r chines, all weights.

No. 2—5 miles, 1,000 pounds an all classes.

No. 3—2 miles, electric, open weights.

No. 4—5 miles, 2,000 pounds an gasoline vehicles.

No. 5—10 miles, handicap, open (all machines start from scratch).

No. 6—200 yards obstacle race.

Special—1 mile trials against manufacturers of high power macl

No. 1—5 miles, open, gasoline vehicles, 5 horse power and under.

No. 2—5 miles, handicap, Detroit private owners.

No. 3—3 miles, steam, open to all weights and classes.

No. 4—10 miles, handicap, open to all classes (all machines start from scratch).

No. 5—5 miles, manufacturers' challenge cup, all classes (donated by the Diamond Rubber Company), open to members of the American Motor League.

No. 6—20 miles, open to all weights and classes.

No. 7—200 yards obstacle race.

Special—1 mile trials against time by manufacturers of high power machines.

The racing committee of the association is comprised of William E. Metzger, E. H. Broadwell and W. M. Perrett.

Legislative and Legal.

Automobiles have been barred from the Government reservation at Hot Springs, Ark.

Raoul Collin, of New York city, was fined $50 by Presiding Justice McKean on August 31 for having run an automobile on Central Park West at unlawful speed.

An automobile ordinance is being discussed at Trenton, N. J., limiting speed to 6 miles an hour within a radius of 3 miles from the City Hall and to 10 miles outside of that district.

The gatekeeper of the Arrowhead toll road, near Redlands, Cal., exacts the prohibitive toll of $50 from automobiles. The road is said to be narrow, hilly and generally unsuited to automobiles.

On September 1 Judge Baker, in the police court at Newport, fined William K. Vanderbilt, Jr.; Robert J. Collier, Robert Fulton Cutting, Jr.; William Burden and W. Watts Sherman $10 and costs each for violating the speed regulation ordinance.

The board of freeholders of Washington County, N. J., have passed a resolution limiting the speed of automobiles to 15 miles an hour and 5 miles in passing teams and in turning corners. Automobilists must stop when signaled by horse drivers.

Mayor Johnson, of Cleveland, has drafted an amendment to the automobile ordinance, providing that touring motorists may spend three days in Cleveland without being subject to the license clause. It will be passed at the next council meeting.

The commissioners of the District of Columbia have under consideration a stringent measure to prevent the speeding of automobiles, especially on the fine roads of Rock Creek Park, the favorite driving place on the northwest outskirts of Washington.

A 10 mile speed limit will be enforced in Lincoln Park, Chicago, hereafter. Recently an automobilist arrested in the park for fast driving was released by the judge on the ground that the city ordinance limiting the speed of automobiles did not apply to the park.

Mrs. Helen H. Peterson, a prominent society woman of Worcester, was fined $10 by Judge Casey, in the Lee District Court at Lenox, September 6, for violating the law which provides that automobilists must stop when a sign of warning is given by a driver of a team.

A resolution was introduced at the meeting of the Middlesex County, N. J., board of freeholders September 3 forbidding to automobiles the use of the county roads, excepting between the hours of 10 a. m. and 4 p. m. Between those hours the autos are to be restricted to a speed of 15 miles an hour.

Mayor James M. Seymour, of Newark, on September 4 returned to the board of works the ordinance recently passed to regulate the speed of automobiles. The mayor vetoed the measure because it provided heavier penalties for fast automobiles than the original ordinance forbidding the fast running of trolley cars and horse drawn vehicles.

Automobile Accidents.

Barclay Warburton's automobile was badly damaged in Philadelphia, September 3. A bicyclist rode right in front of the machine and the chauffeur turned the automobile into the curb to avoid running over him. No one was hurt.

E. B. Edsall, of Bellevue, Pa., met with a serious accident on September 2 while driving a new racing automobile, said to have been purchased by him in New York for $6,000 only the week before, along the Brighton road, Allegheny, breaking an arm. The machine got beyond control on a down grade, and the accident seems to have been due to inexperience and carelessness.

While a gasoline tank was being filled at a station on Communipaw and Crescent avenues, Jersey City, N. J., on September 6, some of the gasoline was spilled. The owner of the vehicle, disregarding a warning, struck a match to light the burner while the automobile was in the building. The match broke and the burning part fell upon the gasoline on the floor. It flashed up and a can of it exploded. The auto was quickly pushed out of the station and saved from destruction, but two other vehicles were considerably damaged by fire.

A bicyclist, Alonzo Wolbert, or Walbert, was run over at Vineland, N. J., on September 6 by an automobile driven by Harold Morgan, of Philadelphia. The bicyclist, a young man, was riding along the road in the evening close behind a farm wagon driven by his father when the automobile came up from behind, at a high speed, it is reported, ran over the bicyclist and into the farm wagon. Wolbert died the next morning. Coroner Heritage, of Glassboro, and a jury held an inquest late this afternoon on the body of Wolbert. A verdict was rendered exonerating Morgan from all blame and terming it an "unavoidable accident."

Changes in the E. R. Thomas Motor Company.

The E. R. Thomas Motor Company inform us about changes in their business as follows: D. Miller, a Chicago capitalist and first vice president and director of the Burlington Railway system, has acquired an interest in the company. The paid up capital is now $387,500, which will be increased as fast as required. The works will be immediately enlarged and the output will be increased to 1,500 automobiles and 1,000 motor bicycles per annum. The company hopes to have 750 automobiles and 500 motor bicycles complete before the opening of the season, so that agents may rely upon a full supply.

On October 1 the Buffalo Automobile and Auto-Bi Company will be absorbed by the E. R. Thomas Motor Company, and the product will be marketed by the latter company, who will make every part of the automobiles and motor bicycles except the tires and batteries.

New Mill Property for the Fournier-Searchmont Company.

The Fournier-Searchmont Automobile Company, Philadelphia, Pa., announce that they have purchased the plant of the Tranier Cotton Manufacturing Company, 3 miles from Chester, Pa., near the Delaware River, and expect to be located there early in October. The purchase includes 50 acres of land, 25 of which will be used for manufacturing purposes and the other 25 for tenement houses, park, etc., for employees of the factory. Two very large mills and several smaller buildings are now standing on the property ready for occupancy. The time from Broad street station, Philadelphia, is thirty minutes and from Chester ten minutes.

The post office and station, which now bear the name of the Tranier Mills, will probably be changed to Searchmont.

Novel Good Roads Campaign.

Wm. L. Dickinson, treasurer of the New York and Chicago Good Roads Association, has started upon a trip to Chicago in a steam carriage from New York. On his way he will conduct a good roads campaign of education.

The vehicle will cover 850 miles, 320 of which will be over good stone roads. The stopping places will include Newburg, Kingston, Binghamton, Elmira, Jamestown, Erie, Cleveland, Toledo and South Bend, Ind. At each Mr. Dickinson will seek to interest residents in the project.

Mr. Dickinson claims that where there are good roads real estate owners and farmers benefit and money circulates.

We acknowledge receipt of an article on "Motoring in the New Forest," from the Imperial Motor and Cycling Repair Works in Gosport, Lake Lyndhurst, England.

BEGINNERS PAGE.

The Fire Tube Boiler and Its Accessories.

(Continued.)

THE WATER GAUGE.

In the drawings of boilers shown in the last instalment of this series a water level is indicated in the boiler a little over half the height of the boiler from the bottom. This level must be maintained by the operator fairly evenly. If the water level should get too high the boiler will prime, water will pass over to the engine and may possibly damage it. If the water should get too low the boiler is liable to be damaged by the fire under it. Some means must therefore be provided to enable the operator to tell at any time how high the water level is in the boiler—whether the feed should be continued or stopped. This means is constituted by a water gauge, two representative types of which are illustrated in Fig. 1.

Referring to the figure, the gauge comprises a vertically arranged cylindrical glass tube, held in fittings at both ends, through which it communicates with the water and steam spaces of the boiler respectively. Boiler and glass tube are therefore communicating vessels in which,

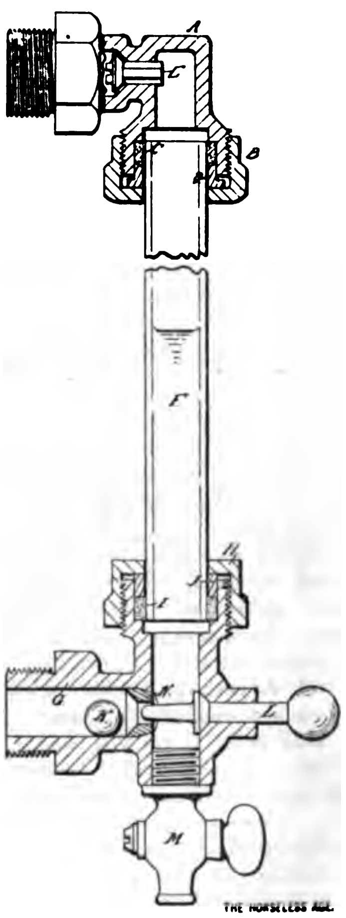


Fig. 1.

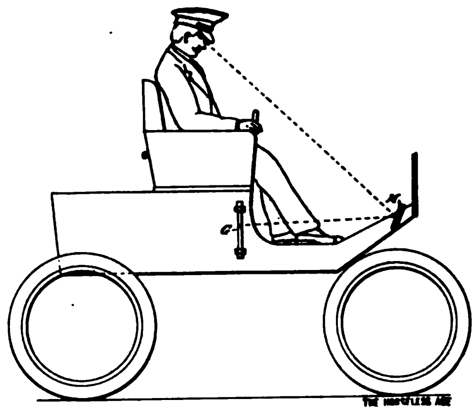


Fig. 2.

according to the well known law of physics, the water will stand at the same level.

Owing to the high pressure maintained in the boiler, the road vibration, etc., the glass tube of the gauge is liable to break occasionally, and to prevent in such a case the steam from the boiler issuing from the gauge fitting and causing damage, automatically closing valves are usually provided to close the communication with the gauge glass. It is chiefly with regard to the construction of these automatic valves or checks that the two gauges shown in the figure—the upper half of one and the lower half of the other one—differ from each other.

In the illustration, A is the fitting for one of the gauges, in the form of an elbow, one arm of which is enlarged, threaded on the outside and counterbored to receive the glass. A steam tight joint is made between the glass and the fitting by means of the cap B, the packing C and the packing ring D. Within the fitting A is located the conical valve E, which under ordinary conditions, when the pressures on its two faces are in equilibrium, is off its seat. Should the glass break, however, the pressure within the boiler will close the valves at both the upper and lower end of the gauge, and thus prevent the escape of both water and steam.

Unfortunately the conical valves sometimes, through rusting or other causes,

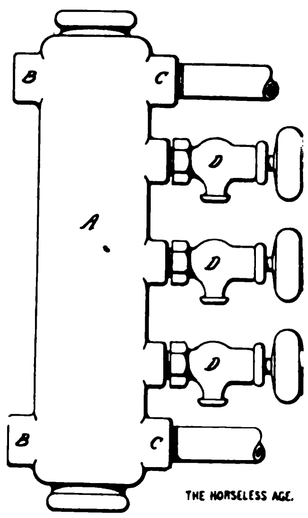


Fig. 3.

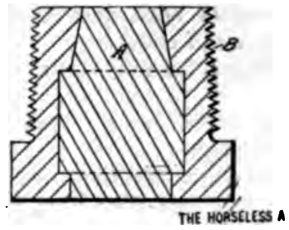


Fig. 4.

stick to their seats, entrapping amount of water in the gauge and a false water level. The experienc carriage driver is very likely to tect this fault by the fact that ur conditions the water level indicat solutely stationary, whereas whe thing is in working order the wat glass continually moves up ar slightly, but if the checks stick v driver is inexperienced or neglig water and a burned boiler are lik the outcome.

To avoid the sticking of th valves, or at least to provide m easily dislodging them if sticking occur, is the object of the constru lustrated by the lower part of th The lower fitting is somewhat d formed than the upper one to r drain cock M. The joint with t tube is made the same as above. of a conical check valve a ball va used, which is adapted to rest o N in the fitting G. Through the the fitting G, opposite the openin valve seat N, extends a rod L spherical knob on its outer end ar lar at a certain portion of its leng the fitting, one face of the collar l clined and resting on a similarly seat in the fitting. The ball, like t cal checks, might stick to its seat, be loosened by pressing the rod L The object on the collar on the r prevent the escape of water o around the rod.

The indication of the water gau course, affected by the level of the on which the vehicle stands. It is possible to make allowance for th ence on the reading of an incline but to make the gauge read fairl rate under normal conditions it located near the boiler. In nearly a carriages the boiler is located in and a water gauge located anywhe the boiler is therefore not in co view of the operator. This diffic been solved in the following (Fig. 2):

The gauge G is located just out seat on the side occupied by the and a mirror M is attached to tl sill in front, near the dashboard, t ror being so inclined that the ope the seat sees in it an image of the indicating the water level. At ni method of observing the water le comes difficult unless a small l placed behind the water gauge or

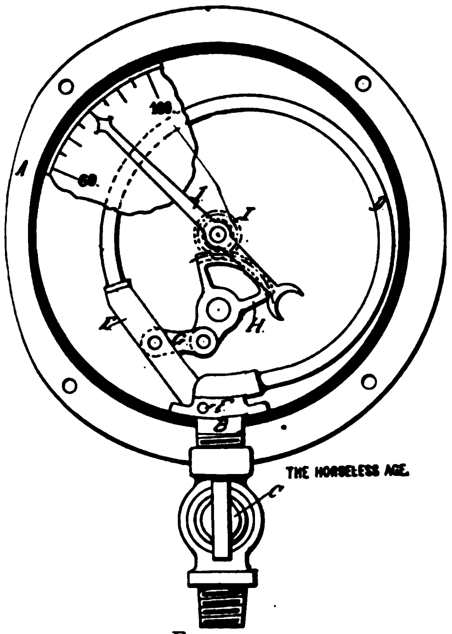


FIG. 5.

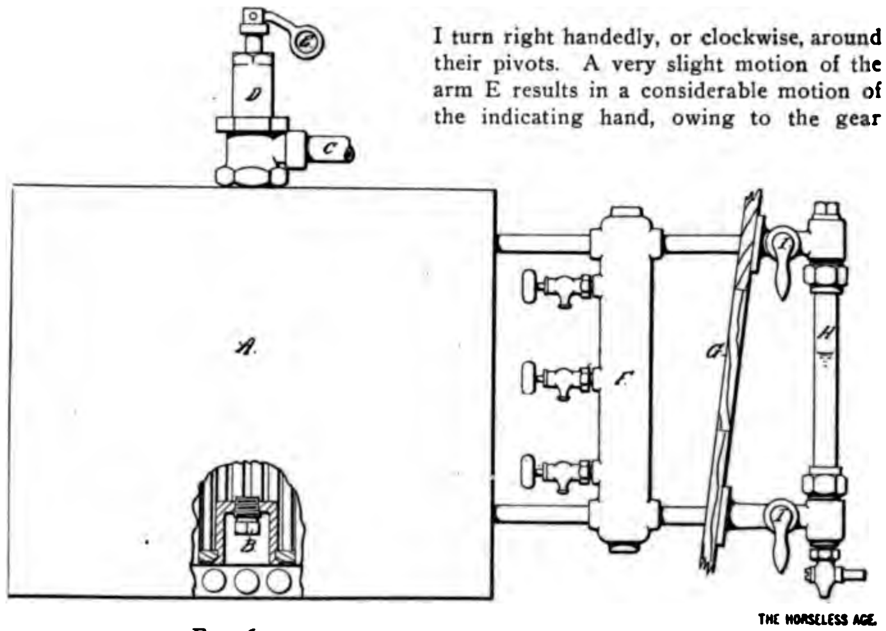


FIG. 6.

of light is thrown upon it from the regular carriage side light.

THE WATER COLUMN.

The water column serves practically the same purpose as the water gauge—ascertaining the level of the water in the boiler. It is less convenient and less accurate than the gauge, but is more reliable, and in automobiles it is intended for use principally when the gauge should fail through breakage of the glass or other causes. The water column consists of a vertically disposed hollow casting A closed at its two ends by plugs. The casting is provided with two internally threaded bosses B B for pipe connection to the boiler and two others, C C, for pipe connection to the water gauge; also with three cocks D D D arranged vertically in line with each other at equal distances. When any one of these cocks is opened it will cause the discharge of water or steam, according to whether the water level is above or below the cock. Usually the water level is slightly above the middle cock. When the latter shows steam the water should therefore be fed to the boiler in increasing quantity, and when the lowest cock shows steam the water level in the boiler is dangerously low.

THE FUSIBLE PLUG.

In a few automobile boilers a safety device called a fusible plug is inserted in the lower head or crown sheet to prevent burning of the boiler in case of low water. As shown in Fig. 4, it consists of a brass plug B bored and chambered out and having the opening filled with a fusible alloy, generally composed of lead and tin and sometimes also containing bismuth. This alloy has such a melting point that as long as the plug is in contact with water on one side the alloy is not affected by the heat of the fire, but as soon as the water level sinks sufficiently to uncover the plug the alloy melts, the steam rushes out of the opening in the plug and smothers the fire, thus preventing the burning of the boiler.

THE STEAM GAUGE.

In order that the steam carriage operator may know when his pressure is high enough to start, and as a check upon the automatic fuel regulator and safety valve, all steam carriage boilers are fitted with a steam pressure gauge, which is generally located on the inside of the dashboard. It would be advantageous to have the pressure gauge also close to the boiler, especially in cold weather, but the mirror method of reading the indications has not yet been applied to this device, we believe.

The steam pressure gauge comprises a cylindrical metal case, indicated in Fig. 5 by the heavy black circle, with a glass front and a flange A at the back. To the cylindrical wall of the case is fastened a fitting B and to the latter, outside the casing, the steam cock C. Inside the casing there is fastened into the fitting B a metallic tube D of approximately horse shoe shape. The outer end of the tube is closed and is rigidly fastened to an arm E pivoted at F to the fitting B. In the centre of the cylindrical case there is a shaft perpendicular to the base of the case. To this shaft are fixed an indicating hand J and a small pinion I. The indicating hand, when the shaft rotates, moves over a graduated scale, of which a portion is shown in the drawing, and the pinion is in mesh with a gear sector H, which is in operative relation with the arm E through the link G.

The steam from the boiler is admitted to the curved tube D through the cock or valve C, and the pressure of the steam tends to straighten the tube. The motion thereby given the arm E is transmitted through the link G, sector H, pinion J and the shaft of the latter to the indicating hand I, which thus shows the boiler pressure on the graduated scale. A study of the drawing will show that when the pressure rises both arm E and indicating hand I turn right handedly, or clockwise, around their pivots. A very slight motion of the arm E results in a considerable motion of the indicating hand, owing to the gear multiplication, and the graduated scale extends all around a circle.

FITTING THE BOILER.

In Fig. 6 is shown a boiler with the various accessories which have been described so far attached. The boiler A is shown in elevation, with a small part broken away to show the location of the fusible plug B in the lower crown sheet. A small dome, several inches high, is flanged into the crown sheet extending into the boiler, and the plug is screwed into the top of this dome.

The steam is drawn from the boiler through a T screwed centrally into the top crown sheet. Into the upwardly extending branch of this T is fitted the safety valve E, and into the horizontally extending branch the steam pipe C. The safety valve is here shown provided with a hand relief device E, which permits the operator to raise the safety valve from its seat at intervals and thus insure against its sticking to its seat. It should be stated here that more frequently the safety valve is located at the side of the boiler to save space in a vertical direction.

The water column F and the water gauge H are shown arranged just inside and outside the side panel G of the body respectively, as is the general practice. Manually operated valves I I are here shown in the connections to the water gauge. Some steam carriages have these either in place of or in addition to the automatic checks.

A chauffeur in the employ of the Cleveland Automobile and Supply Company was arrested recently for having operated an automobile upon the city streets without a license number. The manager of the concern explained in court that they had one number at the shop which they passed from one machine to another as circumstances required. The machine which the chauffeur was driving when arrested had just been acquired by the owner, who had not yet registered. The chauffeur was discharged.

COMMUNICATIONS.

Not Frightened by the Motor.

Editor HORSELESS AGE:

The enclosed photograph shows you how I lead my horse to pasture behind my automobile—a novel sight in this part of the country. One year ago my horse was very much afraid of an automobile, but now calls to the machine whenever he hears it on the street or coming to the stable.

DR. C. R. PONTIUS.

HOW HE LEADS HIS HORSE TO PASTURE.

The Motor Bicycle Contest.

Editor HORSELESS AGE:

In your issue of August 20 I read with considerable interest a letter, by Dr. Clark, on the above subject, in reply to my various criticisms.

Dr. Clark says: "I sincerely hope he did not expect to find any hot tubes or hammer break methods of ignition in 1902." Why does Dr. Clark "sincerely hope" this? Does he consider the present jump spark system finality. To tell the truth, I do not expect to see either the hot tube or the "hammer break" system of ignition used in 1902, but I do certainly expect to see the "hammer break" system used largely in 1903 and 1904. Is Dr. Clark aware that not only is "hammer break" ignition already successfully used, but the current for same is generated by a magneto on a good many motor bicycles today; or is he not well posted on the subject?

Dr. Clark thinks that because the electrical ignition outfit on a motor bicycle "is none too small nor delicate to remove and apply to a 7 or 8 pound single cylinder gasoline motor," it is proven it is the proper thing for a motor bicycle. he makes a great mistake, for he entirely misses the point I made in my article in issue of August 13, where I say: "The small capacity of the cylinder necessitates that the mixture shall be almost exactly right, or else the motor will not go. Being handicapped here, the other necessarily delicate parts, viz., the electrical apparatus (which is not limited by the size of the cylinder), should be of ample proportions in order to help out instead of hinder the delicate gasoline adjustment necessary." In other words the capacity of the electrical apparatus should bear an inverse ratio to the cylinder capacity of the motor, for the following reasons:

First—An approximately correct mixture is much more easily obtained in a large motor than in a small one.

Second—A good compression is easier maintained (in use) in a large motor.

Third—The tendency of the piston to throw oil is much less in the large motor.

Fourth—The heat at the plug is less in the large motor.

Fifth—The distance between piston and plug being greater in the large motor than in the small one the oil has further to go to reach the plug in harmful quantity.

Sixth—As a consequence of the above, the plug is much less liable to become coated with soot in the large motor.

These are my reasons for maintaining that the ignition apparatus on a motor bicycle should be larger and more reliable (for equivalent results) than on an automobile using a single cylinder motor. The electrical apparatus should also be better protected on the bicycle than on the automobile. Has Dr. Clark read the article on page 163, issue of August 13, entitled "Motor Bicycles," by Mervin O'Gorman? By a singular coincidence it occurs in the same issue as one of my letters, and is a corroboration of my remarks.

The muffler question is really not worth wasting any more time on. If motor bicycles are occasionally properly [...] does not prove that they were in [...] sent referred to by me. In the [...] they were not properly muffled.

Dr. Clark wonders if I saw [...] type of motor bicycle in which [...] was incorporated into the frame [...] saw it, and it was one of the ones [...] mind when I said that some had [...] tors "incorporated into the frame. [...] pose I shall have to answer D[...] challenge—"That motor was pret[...] ly attached, wasn't it?" Although [...] a quiet way connected with the [...] cle business, I had purposely e[...] cussion of any individual machin[...] of a wrong construction being [...] same. My object was, and is, [...] the subject as a whole and on i[...] I have no desire to injure or to [...] individual constructor.

Yes, the motor in question i[...] incorporated into the frame, bu[...] the other motor cycles, it show[...] plied ingenuity. The motor sh[...] be rigidly incorporated into, or [...] to, the frame, unless the frame i[...] supported. The pneumatic tire[...] nearly sufficient to properly abso[...] teriorating road vibrations. This [...] the points I expected would be [...] up by a discussion of the subjec[...] cycles of today are on the wron[...] that the "tout ensemble" is t[...] There must be more flexibilit[...] present before the machines ca[...] sidered anywhere near right.

Dr. Clark has me say that "th[...] have to go and the chain be s[...] therefor." As I do not remem[...] ing this, and as it is certainly n[...] lief, will Dr. Clark be good enou[...] me where he has read it over [...] ture?

The belt will have to go and so [...] will the chain. They are both o[...] on a motor bicycle. The argu[...] forward by Dr. Clark for the [...] some of us old automobile men sm[...] much it seems like reading TH[...] LESS AGE of about five years [...] that the word bicycle now takes [...] of automobile. The same old sto[...] to hear about chains and gears [...] O where! O where! is the belt [...] the automobile?

Dr. Clark has let the data of ch[...] motor cycles lay in his cerebrum [...] gestible food in the stomach. [...] probably taken it in, but cann[...] have assimilated it, or he woul[...] the chain driven machine "has ha[...] in view of the results of the m[...] endurance contest. This contest [...] the only reliable data we have o[...] ject. The machines were the b[...] condition, the riders were expe[...] road conditions were equal. Here [...] facts, not guesses:

Thirty-three machines started [...] finished; twenty-four belt driven [...] started and seven finished or 29

nine chain machines started and six finished or 33 per cent. Again, the seven belt machines made a total of 5,608 points, while the six chain machines made a total of 5,903 points. In other words, the chain machines made 5,903 points out of a possible 9,000, while the belt machines only made 5,608 points out of a possible 24,000. In spite of these facts Dr. Clark says: "All the experimental motor bicycles had chain drives, and now have adopted the belt, which is much more satisfactory." It's a funny kind of satisfaction to be only able to average $\frac{5,608}{24,000}$, while the other fellow averages $\frac{5,903}{9,000}$, a kind of "Irishman's rise" affair.

"Many times I have had a belt break and hit me in the back, and thanked God it was not a 5-16 inch chain" (Dr. Clark). While I approve of thanking the Creator at all times, I should like to suggest to Dr. Clark that he must have spent more time "thanking God many times" than he would have had to spend to put on a guard over the belt, to keep it from constantly pounding the need of it into him. The belt is talking the best it can, and is saying: "Please cover me up, Doctor." Strange these satisfactory belts break "many times" and hit the riders in the back with force enough to make them "thank God." Probably a retribution for the words (not found in prayer books) that were used a few moments before at the self same belt, or the lilliputian sparking arrangement.

C. C. BRAMWELL.

An Electric Experience.

READING, Pa., August 18.

Editor HORSELESS AGE:

I had frequently longed to handle and own an electric vehicle; not because I believed it to be equal to a gasoline one, but because I wished to experience that delightful sensation of being able to push the button and let the battery do the rest. This naturally appeals to every man as being the perfect method of locomotion, except for its limitation in the matter of range, and so, when an opportunity offered to trade a second hand gasoline vehicle of prominent make, although somewhat old pattern, for an electric, and get a little cash to boot, the trade was made.

In due time the electric arrived at the freight station, and I gaily hastened thithward to pay the freight and secure my latest toy. It was a beautiful little runabout, upholstered in light whipcord, with tiller steering, wood wheels, ball bearings, solid tires, single motor and four trays having nine batteries each. The rear wheels were under the rear end, the front wheels under the forward end, and the passenger seat well toward the front, so that the forward wheels carried almost as much weight as the rear ones. This was supposed to be necessary and probably good design because of the great total weight.

The switch handle was applied as per instructions, which I had been studying for a number of days, and, taking the driver's seat, the controlling lever was pushed forward gently, and with great satisfaction the impulse of the carriage was noted. After getting acquainted with the power the steering likewise was tried, and, being tiller type, seemed natural. I then started for the livery stable and was going along swimmingly when the first gutter crossed gave such a violent wrench to the steering that I headed across the street and almost brought up into the curb. This was a new experience in steering and one of the kind not to be desired. The heavy weight on the front wheels rendered the matter of controlling them on rough streets a serious thing, and required all the strength I could exert at the end of a long lever. After this I held the steering lever more firmly and reached the livery stable safely.

The factory was still a mile farther away and no direct current wires were in that part of town, so I could not arrange for charging facilities at the factory. I had already been asking the electric company to get in a wire to the livery stable, with meter, for my use, but thus far they had been too busy to attend to the matter, and for the next week the vehicle stood at the livery stable waiting connections for charging; and this prevented any further experience in driving, but some experience of another kind was had.

On coming around one day to see if the electricians had been there the liveryman reported that the electric bell had been ringing, and investigation failed to show any cause therefor. It would ring sometimes in the middle of the night, and the liverymen were a little superstitious about it. A short circuit could not be found, however, and I gave it no further thought at that time.

After about two weeks the proper connection was made, the batteries fully charged, although they had not been much used, and, inviting a friend, we proceeded to take a ride uptown. We followed asphalt streets because the vehicle was evidently not a rough street machine, and only once attempted to drive out a good country road, to the Three Mile House. We had scarcely gotten on the dirt streets, however, when the feeling warned us that the quantity of current was not large and that we had better return to the city. This we did and drove a little further around on good streets, some of them being slight grades, probably less than 10 miles, running the current down until it seemed time to go back to the charging stable, and we then limped home pretty lame.

To say that I was disappointed did not express it, for I had been assured that this vehicle would run 25 miles on good streets and we expected 15 on Reading streets, but evidently did not properly estimate the power required to negotiate the grades. I put the vehicle on the charging stand and lost most of the day getting it loaded up. I did not wish to charge too fast lest I damage the batteries, and charged slowly, for best results required time.

By this time the other party had received his gasoline vehicle, and he too was disappointed. He wrote a very strong letter, winding up with the assertion that he would not have sold his vehicle for $600, and that he had "been pretty well sucked."

I used the vehicle a number of times thereafter, driving it a little in the daytime and charging six or eight hours at night. I aimed to keep the batteries full so as to keep them healthy, and tried to follow out the voluminous instructions to the letter. The electric bell, however, seemed bewitched, and would ring at uncalled for times and when wanted would not ring; so I rewired this and found that the creeping acids of the battery had cut into the insulation, so that while it looked good there was sufficient leakage from one wire to the other to ring the bell. I fixed this, however, and later experienced some trouble with the lamp circuits. These were rewired, and next I found one of the battery connections loose. An attempt to solder these indicated that the leads were so thoroughly filled with acids as to be almost unsolderable, but after much worry this was fixed. Shortly after a bad cell appeared and required removing from the tray, which necessitated cutting the lead connections and removing the jar in order to get out the plates. There was enough deposit in the bottom to short circuit the plates, and this was the cause of trouble. I cracked the jar in removing the plates therefrom, because they had expanded and fitted the jar too tightly. The sediment was removed, the plates put back, the jar repaired and filled with new electrolyte, and recharged, after which it was put in place and seemed all right. This treatment was necessary with other cells in short order, until it became plainly evident that a set of batteries was worse to take care of than a hospital full of sick dogs. Whether used little or much, they required constant testing and repairing, and it was only by this constant attention that they could be kept in anything like good condition.

The motor under the batteries necessitated having the body high from the ground and batteries under the seat made the seat high, so that the passengers were carried uncomfortably high. Getting in and out of the carriage was not easy, the front wheels being so far back that a lady's skirts dragged over the tires every time.

The vehicle was being offered daily on our second hand list, but found no buyers, and as the time went by the price was reduced. Finally in an Eastern city a dealer was found who thought he could dispose of it promptly at a low price, and the vehicle was shipped to him. He spent some time overhauling it and getting it in good condition, but no buyers appeared. It was later advertised at $375, which, by error, was published as $75, and this extremely low price elicited four or five inquiries. We were not prepared, however,

[illegible] sell me at this reduction and to fix [illegible] to [illegible] me accepted an offer of [illegible] or about one-fourth the cost. We had the vehicle shipped and expected to get our money, but received in return a reply saying that the vehicle had arrived with the bottom of the carriage body missing, the batteries spilled out and broken, the acid all over everything, including the motor and upholstering, and the entire rig not worth [illegible]. I [illegible] to the [illegible] to [illegible] and find this condition true was another expense, and resulted in a compromise price a little higher than the [illegible] mentioned. [illegible]

"The vehicle must have been rather roughly handled when taken from the car, for that the bottom of the body should give way in a railroad car after it had held up on rough streets seems extremely improbable. At any rate, the electrolyte should have been emptied out of the battery before it was shipped. It is the general practice of storage battery manufacturers to ship batteries without acid.

That Mr. [illegible] was not able to get the full mileage out of the carriage was probably due to the fact that it was a second hand one, and also because in Reading the streets are quite hilly, we believe, which largely affects the power required.—Ed.]

Accident Due to Defective Brakes.

Editor Horseless Age:

In your last issue (September 3) there appeared, under the heading "Automobile Accidents," an account of an accident to Mr. and Mrs. "Mills," which account bore little relation to the real circumstances, even the name being incorrectly spelled. As Mr. ——— is a friend of mine, I asked him to correct your account of the affair, believing that the accident as it really occurred was calculated to be of service as a warning to other beginners. In this he agreed with me, but as he is not yet a subscriber to your journal, preferred that I make the correction for him.

The facts were as follows: Mr. and Mrs. ——— were driving up a moderate grade on the low gear when the chain broke. Both brakes were immediately applied. The forward brake, acting on the sprocket, was of course inoperative, and it was found that the brake on the differential also did not hold. The result was that the carriage ran backward down the hill, and in the excitement of the moment was permitted to leave the road over a steep bank between 5 and 6 feet in height. When the rear wheels struck bottom the occupants were thrown over the back of the seat, the car itself stopping nearby without upsetting. Neither the car nor the occupants were seriously hurt.

This is another illustration of the increased safety of a machine with a low centre of gravity and long wheel base, as a short, high built machine could, under such circumstances, hardly have failed to upset backward on the passengers. The point specially to be observed in connection with this accident is, however, that although Mr. ——— had been driving for several weeks, he had never once in all that time tested the emergency brake to see if it was properly adjusted. Always finding a foot brake sufficient, he had regarded the breaking of a chain as a rather remote possibility, and had not taken the trouble to find out if he could stop without it.

Within a few days of this accident one occurred to another friend of a very similar nature, although with a different make of machine. In this case the driver was running down a long steep hill at a rather high rate of speed when a small stone thrown up by the wheels struck the chain, causing it to break. In this case also the emergency brake had not been adjusted, and it was found useless. The machine ran down the hill at a terrific rate, but going forward was easier to steer, and finally arrived safely at the bottom. In this case there was perhaps a little more excuse, as the machine had arrived but the day before.

Let us insist on having the emergency brakes at least as good and reliable as anything else about the machine, and then let us keep them in order. And, above all, let us have them on the wheels, or some part directly attached to them. The above accident occurred because the brakes on the differential were not properly adjusted. They might just as well have been caused by failure of the differential pinions or the differential crown gear keys. Differential brakes are cheap to the manufacturer, but dear to the user. That is why they regulate the matter by law in France. Why do not some of our ultra strenuous town councilmen do something along this line here? They would protect more lives than by silly ordinances regulating speed at 5 miles an hour.

Caspar W. Miller.

[We are obliged to our correspondent for the correction. The account was based upon reports in a number of daily papers. As regards the matter of brakes, it would be well if State laws required double acting brakes, acting directly on the wheels, hubs or the axles to which the wheels are keyed, with equalizing operating mechanism. This is now known to be the only thoroughly reliable form of brake. All buyers should demand such brakes or should have them fitted elsewhere if they cannot get the manufacturer to do it. These brakes are being constantly adopted by manufacturers in this country, and we expect to see all 1903 models of any pretension as road machines fitted with them.—Ed.]

A Practical Lesson in Good Roads.

Editor Horseless Age:

Between my house and an adjoining town, which I have been visiting in a business way during the past month, two or three times each day, there is a long, steep hill, which is located in one corner of another town. This hill is rare ersed by the residents of the town it is located, and as a result is poorly cared for. I have observed road bed was very good, but tha covered with a multitude of stones in size from those of a hen's egg as large as one's two fists. The la presumably have been used by t to block their wheels while they their horses. I have been driving hill during the past month a 3½ power motorette, and have never b to get up the hill on high speed cl attributed it to the small power of chine until the other day I was st a 12 horse power machine of a wel make. I then made a complaint superintendent of streets, and he my request by raking all the sto of the road. As a result, I hav time since been able to go up the my high speed clutch with ease, course, in coming down I have b to run wide open, while before everything off and hung on for d I have long maintained that it w for every town to keep one man road continually during the summ ing out stones and filling up small sions. This experience proves con to me that a few loose stones are make the difference between easy and safe riding, and the expendit great deal of power and an i amount of wear and tear on your machine.

A Regular R

Air Cooling Was All Right the Summer.

Editor Horseless Age:

In the spring, when I purchased cooled automobile, many experienc mobilists told me that when the hot came I would be unable to use the as it would overheat.

I have used it during the hott and never heated the engine at a and made many long runs. Du season I have worn out one ch sprocket, broken two inlet valves exhaust, but had no other expense to the tires. Furthermore, I hav had to tighten a spoke in the str ugly wheels. After a season's st the engine gives almost as much p when new. If anyone can give account of his summer's outin have it.

E. A. Fair

Hope for Electric Ideal

Editor Horseless Age:

When one considers "The Real of Their Hopes," as outlined in a issue by Mr. Clough, it may be consider a pleasant dream inste nightmare. While I am not parti electric, still a statement like "the combustion motor, as applied to purposes, is in the early stage of ment" is not enough proof in my the ideal vehicle to be a developme

this line. Can it not be as well said of the electric that storage batteries as applied to automobiles are also in the early stage of development? The improvements in storage batteries certainly have not been more marked than that of the gasoline engine, neither have they reached their limit of development.

There is nothing simpler, nor is any piece of mechanism as near perfect, as the electric motor with its controller, and with this go reliability and flexibility. Where there is a constant rotating effort the liability of parts pounding to pieces is certainly less than where there is a reciprocating motion, however nicely balanced. These advantages, combined with absence of heat, odor or noise, make this part of the electric equipment so superior to the gasoline that all we need do is to compare storage batteries with the gasoline system as a whole.

An ideal gasoline outfit would be a system in which the engine is reversible, flexible and self starting, such advantages as possessed by the steam engine, so that clutches and transmission complications can be done away with, an absence of the cooling system, a reliable carburetor not dependent upon the highest grade fuel, and consequently using such as "can be purchased at any country grocery." The ignition must be simpler and more reliable. How far, then, from being perfect will the gasoline vehicle appear if this is the ideal?

Let us see what the main objections are to the future of the electric vehicles—inconvenience in charging and cost. Can we not hope for a stationary transformer instead of a "sub-station," as well as a self starting gasoline engine? I believe more so, for I have seen several laboratory instruments which give promise of this and at a slight cost.

Is it unreasonable to figure economy in express service on the present horse scale, in which the express company makes its own power? Surely we do not hope for a gasoline unit in a vehicle to be as economical as a unit twenty-five or 100 times as large? Or is it unreasonable to figure economy for light companies to reduce power rates if current is used for charging after the peak of the load at night until morning?

Let us consider what possibilities the "promised battery" has. The theoretical capacity of the cell mentioned is 160 ampere hours per pound of active material, while that of the lead cell is just a little more than one-quarter as much. Is there any reason to suppose that we should not be able to use as high a per cent. of the total theoretical capacity in this new battery as in our present cells? Five ampere hours is to be had at present at a fairly high rate; this would give twenty on a 2 volt basis from the other, or 40 watt hours per pound. The possibilities, then, are for using a 350 pound battery instead of three times that amount, and, in fact, a great deal less than 350 pounds on account of the possible lighter construction of the remainder of the vehicle. I hear it then said that this will make the cell weak and then destroy the low rate of depreciation. The possibilities with a stronger material such as this cell has over the old, and the fact that the products of discharge are conductors instead of non-conductors, as in the lead cell, certainly substantiate hopes for the better. In this case you would have a vehicle with total load weighing 1,000 pounds (two passengers) traveling 15 miles an hour for almost ten hours, or 150 miles.

I suppose what one then wants is to be able to charge "in minutes instead of hours," and without depending upon power mains. For a probable solution of this we are indebted to a discussion before the American Institute of Electrical Engineers and recorded in the 1901 proceedings.

It was said that since the electrolyte was needed only to transfer oxygen from one plate to the other, and that this is all that occurs in charging, it would be possible to take the plates out of solution when discharged, and by heat or chemical means oxygen taken from one electrode and oxygen applied to the other. Is it possible to go one step further, and, by the introduction of a chemical into the cell, have this oxygen transfer take place and thereby charge it?

I do not wish to defend this new battery or any other, neither do I care to say that electric will outlive gasoline automobiles, but when it is suggested that the gasoline engine has possibilities, I say so has the electric. The systematic study of electrochemistry is new, and when I know what is needed to perfect the gasoline rig and how far we are from it, I say the possibilities are greater along the other line.

F. J. Newman.

Explosive Engine Queries.

August 28, 1902.

Editor Horseless Age:

For the past three years I have been using a four cycle, 5½x6 inch gasoline motor on a carriage and have used platinum, steel, silver and other metals for sparking points. All of these points soon burned off and required continual facing and adjusting, many times not lasting for more than 25 miles. I have also used a two cycle 6x6 inch motor on a launch for two years, using a pair of steel points. The same motor and points have now been used six years in all, and the points have never been cleaned or renewed and are in perfect condition today. For more than a year the former motor has been run with a dynamo and the latter with a magneto, no batteries being used in starting in either case.

What is the cause of the one burning off and not the other?

Also, why does the two cycle motor give 280 turns per minute when exhausting into a muffler and only 250 when exhausting into open air (free), showing back pressure is an advantage?

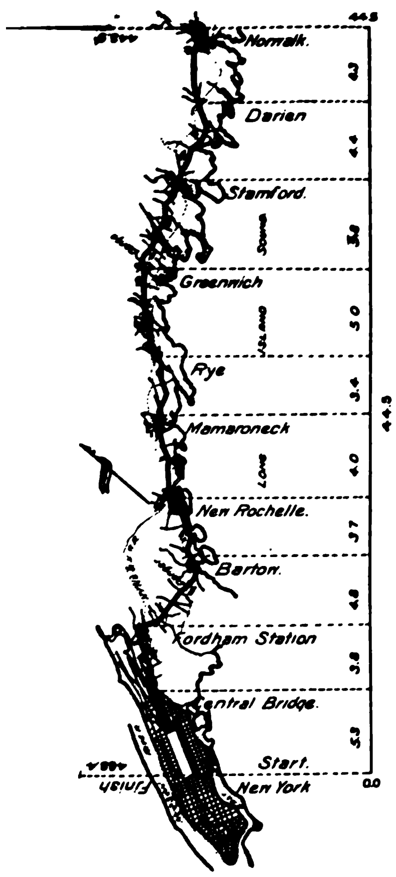
W. G. Walton.

[The most probable cause of the points burning away so quickly in the first named machine is that the dynamo generates too strong a current. You should try to remedy the defect by running the dynamo slower.

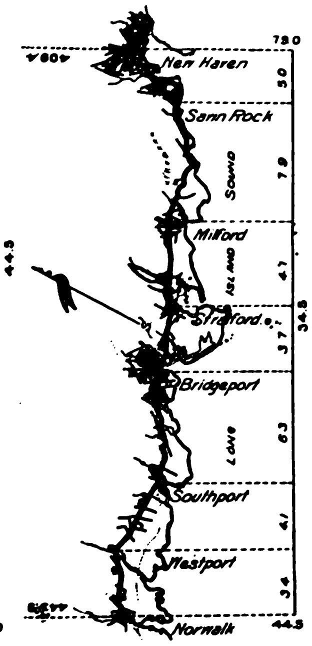
Ordinarily engines run slower with a muffler than without one, and it is certainly not the back pressure of the muffler which causes the increase of speed. We have never heard of a muffler with negative back pressure, but such a thing is not altogether inconceivable. The muffler and its piping might be of such form and dimensions as to permit of a wave motion or surging therein in harmony with the speed of the engine, so that there would be a partial vacuum in the muffler at the moment the exhaust valve opens; the power required for the expulsion of the gases would then be furnished by the kinetic energy of the gases, and the cylinder would be cleared more completely than it would be otherwise.

This is the only possible explanation we can think of.—Ed.]

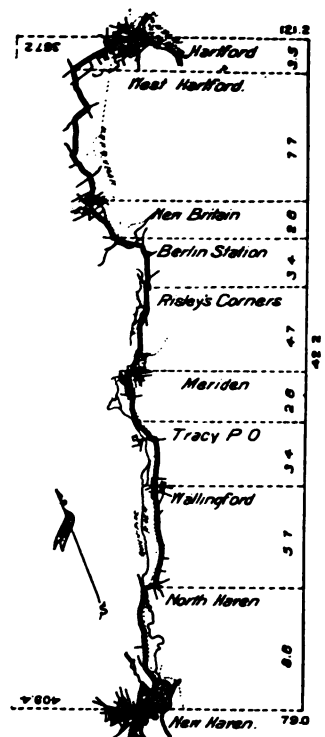
Scene of the Fatal Accident at Elberon, N. J.
From C. E. Collier, Binghamton, N. Y.



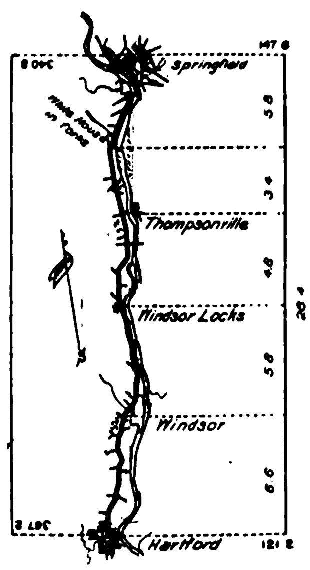
1 AND 12 PERIOD.



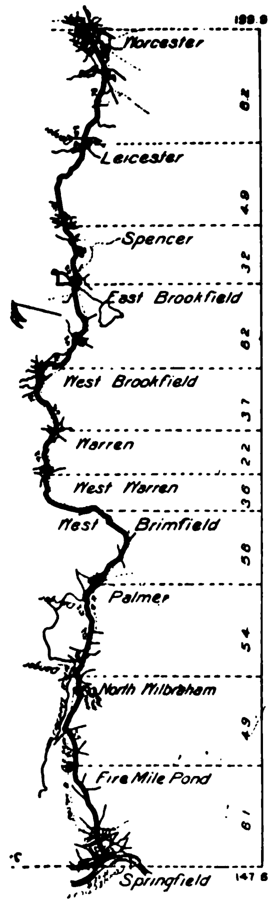
2 AND 11 PERIOD.



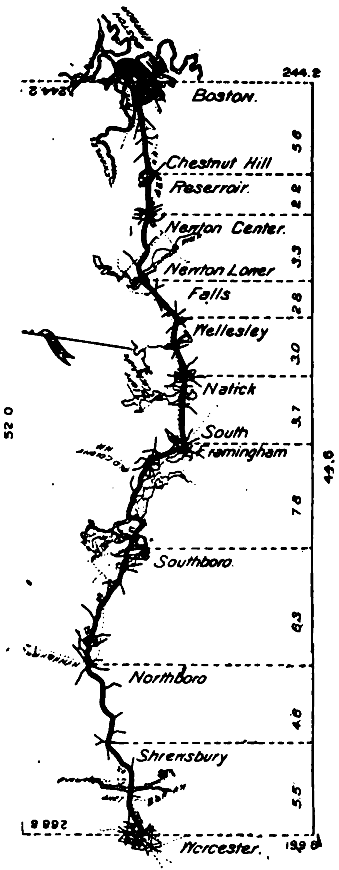
3 AND 10 PERIOD.



4 AND 9 PERIOD.



5 AND 8 PERIOD.



6 AND 7 PERIOD.

Road Description of the A. C. A's 500 Mile Reliability Run.

THURSDAY MORNING, OCTOBER 9.

The automobiles taking part in the contest will line up, irrespective of numbers, in Fifty-eighth street, on both sides of the street, facing east. The first vehicle will take its place in Fifty-eighth street, at the corner of Fifth avenue. Entry into Fifty-eighth street must be made from Sixth avenue. No vehicle will be permitted to enter from Fifth avenue or from t
The vehicles will be started at ha
intervals.

The start will be made at 9 o'clo
Fifth avenue to 112th street;
into 112th street to Seventh aver
right into Seventh avenue to 15:
turn left one block to Central Bri
Central Bridge straight ahead int
avenue (trolley tracks), which f
189th street; turn right on 189
to Webster avenue (trolley);
Webster avenue to Fordham ro
right past Fordham station (9.0
straight ahead on Pelham avenue
ham Bay Parkway (look out for
road crossing) to the Shore roa
left on Shore road and cross
Bridge.

Continue straight ahead past
Island and Travers Island entra
New Rochelle; turn left at end
pavement into Centre avenue; t
into Main street, New Rochelle.

Follow trolley through Larchn
Mamaroneck. Water and gasolin
man's, in Mamaroneck. At the
fountain in Mamaroneck keep sl
the right and cross Mamaroneck
stone bridge. Continue to the end
dence Park and take right fork do
into Rye. Cross trolley tracks an
fork (large white flag pole in fc
right fork up the hill and cross bri
New Haven Railroad. Continue
ahead and again under New Ha
road, and turn left into Main str
Chester.

Follow Main street (trolley) to
bridge across the Byram River (
—27.71 miles). At fork just after
bridge keep to the right and up
hill; at fork at top of hill keep to
(short down grade, steep and
Keep along Post road up Byram I
down another hill, across a brook
Greenwich (Lenox Inn). (Gasc
water.)

Continuing along Putnam avenu
wich, following the trolley to for
diers' monument, where keep to
and down a bad hill. At fork ju
crossing bridge keep to the right
bridge. At next fork (high stump
tree in fork) turn sharp to the rig
ing a detour around Mianus Hill.
end of this road turn left along
of Mianus River into Mianus, fo
centre of square.

After leaving the square in Mi
right and cross bridge over Miar
and up a hill; then down a short
fork, keeping to the right. At n
going into Stamford, keep to the
on right reads "Stamford Direct
down several steep hills to W
street and along West Main
bridge over Mill River. Turn ri
bridge and follow Main street tc
Park, Stamford (35.8 miles), whei
begins.

Follow trolley on Main street

treet to fork at East Park (blue hurch on the left). Turn left up ll, on which trolley turns to the left top at Glen Brook avenue. Leave at this point, keeping to the right; wn hill and under New Haven Rail-idge (Myrtle avenue), where trol-ns again; follow trolley to and over n River, past Noroton post office wn a short hill to a fork; turn left ow trolley to Darien.

'arien pass under railroad bridge iiles) and continue straight ahead, g bridge over Five Mile River, lirt road begins. At fork just be-'orwalk Hospital keep to the right ı steep hill to and past Norwalk into West avenue, Norwalk. Turn left, West avenue to Norwalk Ho-re time will be taken for the noon

URSDAY AFTERNOON, OCTOBER 9.

Norwalk Hotel follow trolley Norwalk River (44.52 miles). Turn p a steep winding hill to East ave-rn left and follow trolley to West-enue (large white frame church on ı; turn right up a hill and follow the past the Children's Home, to and the Saugatuck River into Westport ort Hotel 47.8 miles). Continue ahead and at next fork keep to the id follow the trolley through South-d Fairfield to Bridgeport.

ng into Bridgeport go under rail-idge and at fork of trolleys take left Fairfield avenue), which follow t ahead to railroad depot. Cross ınd over bridge into Stratford ave-At next fork, 3 miles out, turn left Stratford. Turn right at drinking n and continue straight ahead, g Housatonic River, to Milford. and gasoline.) Keep straight ahead ı Milford past narrow street park over Memorial Bridge, and imme-turn right around an old mill and ft at sign "New Haven 11 miles." ıe straight ahead and at next fork ght fork. Half mile beyond turn eft at Woodmont, at sign "To New " Follow shore to "Coxes," Savin Turn left one block, then right, g back into shore road, which fol-the end at Second avenue. At Mon-reet turn right one block to First and continue straight ahead to Elm (trolley), West Haven. Turn right lm street, which runs immediately mberley avenue.

ı Kimberley avenue bridge, continue rard avenue at bridge over railroad Turn left into Howard avenue, follow to Congress avenue (New County Hospital on northeast cor-Turn right into Congress avenue, first square bear left across square ırch street and straight ahead to street; turn left into Chapel street t street; turn right into York street aight ahead to night control, and garage at factory of the New Haven Wheel Works.

FRIDAY MORNING, OCTOBER 10.

Start from garage at 9 a. m.; York street to Chapel street, turn left into Chapel street, two blocks beyond turn left into Orange street, 1 mile to Lawrence sereet; turn right into Lawrence street, which leads into State street. Keep left at next forks, paralleling railroad tracks and straight ahead. Coming into North Haven turn right at forks at sign "Meriden 12 miles," cross bridge over Quinnipiac River, cross railroad tracks and take first left to Wallingford. Straight ahead through Wallingford, railroad station on the left. At next forks turn left under railroad tracks and then right at sign "Meriden 3 miles." Straight ahead, past Tracy post office. At next forks (sign "Meriden Automobile Station" in forks) take left fork up hill and a short distance beyond down a long hill into Meriden.

Cross trolley tracks at bottom of hill and up another hill; at top turn right into Main street. Keep on Main street to Meriden House (Colony street). (Gasoline and water at Meriden Automobile Station, 121 South Colony street.)

Turn left into Colony street, which follow to end of town, and bear right across railroad tracks. Keep left at next forks to Risley's Corners (signboard at crossroads), where turn right up hill and straight ahead into the residence portion of Berlin. Follow trolley tracks to Woodruff's grocery store, turn left with trolley, down hill, past Berlin railroad station, passing under tracks and turning right with trolley toward New Britain.

Coming into New Britain, keep straight ahead (trolley tracks turn to the right) to end of street and turn left into Main street. Keep on Main street past park. Turn right with trolley and three blocks beyond bear left into Hartford avenue. At next fork keep straight ahead (left fork) and take next left at sign "Hartford 8 miles." At next fork (where straight ahead road goes down hill to trolley tracks and Elmwood) turn left to West Hartford, where turn right and follow trolley through Farmington avenue into Hartford.

Pass under railroad bridge into Asylum street to Trumbull street, Allyn House, where time will be taken for the noon control.

FRIDAY AFTERNOON, OCTOBER 10.

From the Allyn House, out Trumbull street to Main street; turn left into Main street and take first right (Windsor avenue) straight ahead to Windsor. In Windsor bear right at end of village green at sign "Windsor Locks 5 miles;" cross under railroad tracks and cross bridge over Farmington River. Keep right at next forks at sign, "Windsor Locks 3 miles." In Windsor Locks at end of town bear to left away from river and up a short hill. At forks on top of hill take right fork (River road). At next fork (white house in fork) keep right, along Connecticut River to South End Bridge. Cross bridge into Springfield.

Take first left into South Main and Main street and straight ahead to Marble street; turn right into Marble street to night control and garage at the Springfield Riding Academy.

SATURDAY MORNING, OCTOBER 11.

Start from the garage at 9 a. m., Marble street to Main street; turn right on Main street to State street (Masonic Temple on corner); turn left into State street. Straight ahead 1½ miles to small city park, where keep left fork. A mile and a half beyond take right fork (Boston road), and straight ahead, past Five Mile Pond. At next fork, just beyond Nine Mile Pond, at sign "Palmer 5 miles," take left fork into North Wilbraham. Pass railroad station and turn left under tracks (caution) and immediately turn right toward Palmer.

Coming into Palmer be careful of sharp winding down grade, with narrow bridge at bottom. After crossing bridge turn right and go under tracks.

Straight ahead through Palmer to railroad bridge at end of town. Do not cross bridge, but turn left one block to white church; turn right one block, then turn left one block and then right at large red school house and straight ahead, keeping on north side of railroad tracks for about 4 miles; then turn right, across bridge over Quaboag River, and under tracks, and immediately turn left.

Coming into West Brimfield, take left fork over tracks and turn right to West Warren. Straight ahead through West Warren to Warren (gasoline and water). Straight ahead through Warren, bear right across tracks and then turn left.

At forks at Lake Wickaboag take left fork to West Brookfield. At forks in West Brookfield take right fork and an eighth of a mile beyond again right to Brookfield. At Brookfield Hotel turn right past a small park for one block and turn left at white church. At water tank further on turn right into Spencer road and an eighth of a mile further turn left to East Brookfield, where keep left fork at Furnace Pond. At next fork (sign "Kane's Shoes" in fork) keep left and follow trolley into Spencer.

Straight ahead through Spencer up a long 10 to 12 per cent. grade and over a succession of lesser grades to Leicester.

Straight through Leicester and coming out of Leicester (caution) down a 15 per cent. grade, and straight ahead into Main street, Worcester.

Straight ahead on Main street to Front street (City Hall), where time will be taken for the noon control.

SATURDAY AFTERNOON, OCTOBER 11.

From the City Hall straight down Front street to railroad station. Do not cross tracks, but turn left and at next fork of trolley keep to the left (Shrewsbury street). Continue straight ahead to and across Lake Quinsigamond, and a mile beyond take left fork (Maple street) into Shrewsbury. Straight ahead to Northbor-

rough. In Northborough turn right at drinking fountain. At next fork (white house in fork) keep left; take next right; keep left at next fork. At next crossroads turn sharp right in front of white house, and a mile beyond cross railroad bridge and turn left. Keep to the left at next crossroad in front of red barn, and straight ahead alongside of reservoir to Southborough.

Straight through Southborough, cross railroad tracks at station and immediately turn right and cross causeway over reservoir and take left fork for Framingham. At next forks (large white barns) keep right, and again right at next fork, skirting reservoir into Framingham Centre.

In Framingham Centre at drinking fountain turn right and follow trolley to South Framingham.

Cross railroad tracks in South Framingham and immediately turn left and follow road paralleling railroad tracks to Natick. (Gasoline and water.)

Straight ahead through Natick to Wellesley. Keep to the left through Wellesley and Wellesley Hills to Newton Lower Falls. Half a mile beyond turn right into Beacon street, which follow straight ahead through Newton Centre and skirting Chestnut Hill Reservoir to Massachusetts avenue, Boston.

Turn right on Massachusetts avenue to Columbus avenue; turn left on Columbus avenue to Park square, Harvard Automobile Station No. 2, where time will be taken for the night control.

The 7th, 8th, 9th, 10th, 11th and 12th periods are shown by the same maps, which must be read in the reverse order.

NEW VEHICLES AND PARTS.

Apperson Brothers "Class A" Tonneau.

The Apperson Brothers Automobile Company, of Kokomo, Ind., have placed on the market two types of touring cars, "Class A" and "Class B." The photo engraving illustrates the former or larger type of carriage. The vehicle resembles French automobiles in general appearance, but the arrangement of the machinery is altogether different. The crank shaft of the motor is parallel with the axles, and there are but two cylinders, as against four cylinders in the conventional French gasoline machines of similar rating. The engine has a bore of 5¼ inches, a stroke of 6½ inches and runs at 600 revolutions normally. The speed of the motor may be accelerated, however, to 1,200 revolutions per minute.

The wheel base is longer than it appears to be, namely 7 feet 6 inches, and the gauge is 4 feet 2 inches, or 6½ inches less than standard.

The wheels are of wood, have twelve spokes each and are shod with 36x4 inch clincher tires. The front axle is a solid forging and has axle ends of the Panhard type. The rear wheels are keyed to the axles, and those in front run on roller bearings. The front springs are of the semi-elliptic pattern, 40 inches long, 1¾ inches wide and have six leaves. The rear springs are of the full elliptic pattern, 36 inches long, of the same width as the others and with an equal number of leaves. The frame is composed of channel steel beams, which are lined with wood to stiffen them.

The motor is located under the bonnet on the left hand side and has diametrically opposed cylinders, each of which has a carburetor of improved design. The box that incloses the variable speed gears is located on the right hand side and its driven shaft is on the same level with the crank shaft, between it and the dash. A "Diamond" roller chain of 1½ inch pitch and ¾ inch width transmits motion from the countershaft of the gear box to the compensating gear, which is centrally located on the rear axle. The distance between sprocket centres is about 5 feet. All the bearings of the change gear and the engine, as well as the working cylinders of the latter, are lubricated by a McCanna magazine oiler, is secured to the dash and is hidde view by the bonnet. Ten tubes ru this lubricator to the parts that nee cation. Primary ignition is empl this motor and the spark is advanc foot pedal. When the engine is sta current is taken from a "Nesta" battery with a capacity of 75 ampere which is also used to supply two sm tric lights on the dash and a small r in the rear of the tonneau body. A as the motor is running smoothly t tery is thrown out and the mag thrown in by turning button s These are of a type used in electr circuits, of a substantial design and cured to the dashboard.

The radiating coils—or, rather, co consists of a tube with many elbov located in front, partly within and below the bonnet. All the disks are per and are fluted. A centrifugal driven by the flywheel, forces the through the coil. The friction pu the pump runs in a V shaped groove into the rim of the flywheel. The second groove in the wheel, into wh leather rim of the magneto's pulley f

The variable speed gears are sliding type. Three forward and a are provided, all of which are thr by a single hand lever. The control consist of a 15 inch steering hand wh emergency brake lever—both of wh on the right hand side outside of th —a pedal to open the throttle, ano shift the spark and a pedal to reli main clutch and apply the brake i thrust farther forward. To apply t brake the operator must first take b off the spark timing pedal. The mot slows down automatically, which desirable. To prevent it from racin the main clutch is relieved it is ne to cease pressing on the throttle spark and throttle pedal are of th style, and are attached to the incline board. The foot brake is employed It applies a brake band to the drum compensating gear. The emergency bands are located one on either side differential. All the brakes are doul ing. The chain is not obliged to ho the machine when the foot brake is

The body has roomy seats upholst leather. The cushions are tufted a lazy backs are smooth. Between th in front there is a dividing wall. Ea is 16 inches deep and 20 inches wid tonneau has high back rests and door. Its seats are 36 inches long and 17½ inches wide. The gasoline ta der one of the tonneau benches, h gallons. The water tank, under th level and just below the front seats capacity of about 8 gallons.

At an engine speed of 600 rev the car will cover 30, 18 and 6 m the high, intermediate and low ge spectively. The weight of the vehic plete is said to be 2,500 pounds.

The Apperson Brothers Model A.

The Sleeper Steam Engine.

A new form of steam engine has recently been placed upon the market by the Sleeper Engine Company, Limited, of Montreal, Canada. This engine is said to be adapted for automobile as well as for stationary and marine purposes. For automobiles the company manufacture a 5 horse power size, for which the following claims are made:

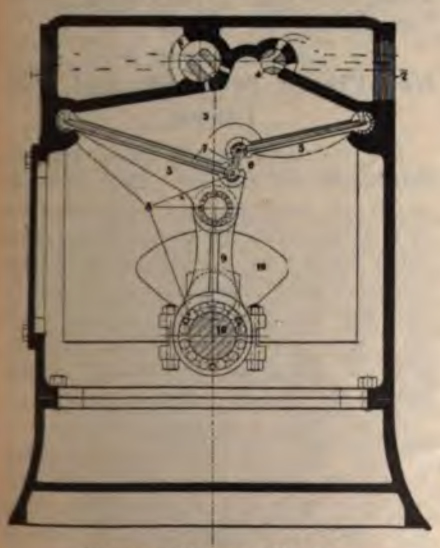
This engine weighs only 35 pounds; it is dustproof, simply and perfectly lubricated, and possesses the features of quick control, instant reversing without special gearing, reliability, durability, compactness, steam economy, freedom from vibration and absence of flywheel.

The Sleeper engine, although some experts have called it a semi-rotary, is a reciprocating engine. It differs, however, from the ordinary reciprocating engine in that the expansion chamber is entirely different from the usual one of cylindrical form. Instead of a cylindrical piston a flexible wall is used, made up of two parts connected by a link, the whole member being attached to the crank shaft by a connecting rod, as shown in Fig. 1. Steam is admitted to the chamber by a valve of the Corliss type, giving to the flexible wall an outward movement which actuates the crank shaft.

In Fig. 2 is shown another type, in which no connecting rods are used to connect the flexible wall and the crank shaft. Instead, a crank eccentric is provided, upon which the flexible walls bear by means of rollers, one after the other, as steam is admitted to the chambers.

With engines of the type shown in Fig. 1 the valves are of the Corliss type, being operated by an eccentric on the shaft. On those shown in Fig. 2, however, valves of another design are used. In principle and design this valve is said to be an entirely new departure. It is entirely enclosed in the steam chest and is operated by means of a lever and sleeve.

A good deal of friction has been eliminated in these engines by the use of roller bearings. In all cases the pins, shafts and other rotating parts, as well as the rollers themselves, are of steel hardened and ground; the outer sleeves, in which the cages revolve, are of steel similarly treated. The cages which retain the rollers are of a new design, ensuring an absolute parallelism between shaft and rollers, and preventing any binding or twisting tendencies. This form of bearing is said to have been subjected to long and exhaustive tests, and its merit and durability have been proven.



Sleeper Engine, Fig. 1.

To prevent leakage of steam from an expansion chamber, a system of packing strips and springs is provided. These strips take up wear automatically. The packing on the crank shaft is especially intended for high pressure work.

Lubrication is effected by feeding the steam through the oil inlet valve in the usual way, and it is then splashed over the entire mechanism.

Larger sizes of this engine are built in compound form.

A number of tests of a 12 horse power Sleeper engine was made last November at McGill University by Homer M. Jaquays, assistant professor of Mechanical Engineering. His report on these tests is in part as follows:

The engine submitted for testing was a single cylinder, single acting engine of about 12 brake horse power. It was without piston or piston rod, a rotary motion being given to the shaft by means of a rod connecting the crank pin with the movable cylinder walls.

During the trials the governor was disconnected from the engine, so that the cutoff could be fixed as desired. The steam pressure was varied by means of a throttle valve placed close to the engine, and the pressure in the steam chest read by means of a Schaeffer & Budenberg gauge.

The exhaust steam was condensed in a surface condenser at atmospheric pressure, from which it passed into weighing tanks

Trial No.	B. H. P.	Revs. per Minute.
1..........	5.63	650
2..........	10.2	707
3..........	13.1	726

mounted on a Fairbanks scales. Steam was supplied from boilers of 60 horse power capacity.

No tests were made during the trials to determine the quality of the steam. Laboratory tests carried on almost daily, under conditions similar to those attending these trials, show, however, that the steam is about 98 per cent. dry. The power developed was absorbed by a water cooled rope brake, the load being indicated by a Fairbanks weighing machine.

The object of the trial was to determine the steam consumed by the engine per brake horse power per hour when working at various loads. The loads chosen were approximately one-third full load, two-thirds full load and full load. No attempt

Sleeper Engine, Fig. 2.

was made to determine the indicated horse power.

Care was taken to have the engine running under the trial load long enough before commencing the test so that all the conditions might become constant. Since this was the first single cylinder engine of its type to be tested in the laboratory a large number of trials were necessary to determine how pressure, speed, etc., affected the economy.

The steam consumed per brake horse power per hour is low for an engine of this small size. It is considerably lower than that of any rotary engine tested, to this date, in the laboratory. The consumption also compares most favorably with that of any single cylinder engine with which I am acquainted. It is lower than that of any single cylinder reciprocating engine of the same size tested, to this date, in this laboratory, and is about the same as that obtained by Mr. Williams in his tests of a single cylinder reciprocating engine under conditions favorable for low consumption and with an engine considerably larger than the one herein reported on.

The results obtained from the trial are as follows:

Steam Used per B. H. P. per Hour.	Steam Pressure Gauge.
56.5	44 (one-third full load)
40.4	53 (two-thirds full load)
36.4	84 (full load)

The British thermal units for brake horse power per hour were:

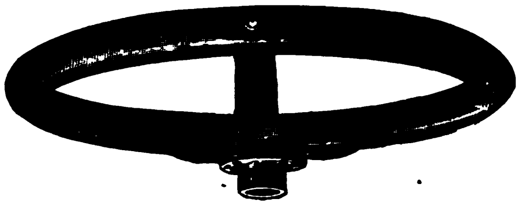
Trial 1......................	905
Trial 2......................	647
Trial 3......................	590

Variations in speed between 650 revolutions per minute and 725 revolutions per minute made very little difference in economy.

In trial No. 3, full load, 36.4 pounds steam per brake horse power per hour were used. This is an exceptionally good result for a single acting single cylinder engine, and one, I believe, that has not been equaled by single cylinder engines of this small size. The performances in trials No. 1 and No. 2, at one-third full load and two-thirds full load, are also creditable.

Konigslow's Steering Wheel.

Accompanying cut shows a steering wheel of new design, manufactured by Otto Konigslow, 45 to 49 Michigan street, Cleveland. These wheels are constructed of sheet steel spiders, nickeled or enameled,



or brass, and assembled in laminated hickory rims. The rims are either natural or mahogany finish. These wheels are made of 13, 14, 15 and 16 inches outside diameter. The company have already closed a number of large o-ders, some manufacturers of automobiles using them exclusively in their equipment.

...OUR... FOREIGN EXCHANGES

The Foreign Press Waking Up to the Speed Nuisance.

Following are some recent expressions on the speed question from European publications:

"If need be, sure and efficient mechanical means will be found to prevent these excessive speeds. May this menace suspended over their heads, a new sword of Damocles, render automobilists more prudent, since the dangers which they run themselves and to which they subject others do not suffice to calm their madness for speed.

"Are the majority of automobilists possessed of enough common sense that this extreme method need never be employed? We hardly dare to hope, although we sincerely wish that this prove to be the case." —*E. Hospitalier, in La Locomotion.*

"We have frequently pointed out the pernicious effects of driving at excessive speed, even when the drivers have a lengthy experience and are able to rely on effective resources in almost every emergency. The offense is a thousand times worse when committed by an amateur who has only recently learned to drive. It is not merely that he endangers himself and menaces other users of the road; he fosters existing dislike of the motor car and creates new areas of prejudice."—*Automotor Journal.*

"Efforts are being made to find a suitab!e course for the next Gordon Bennett Cup race in Scotland. * * * Antagonism to speed has developed enormously of late, and would present the most insuperable obstacle; for within the last month Scotland has been the scene of several accidents, one of them fatal. * * * We are not possessed of any intense desire to see the race run on the Scottish side of the border."—*Motor Car World.*

High Speed Cars and the Proposal of Numbering in England.

While a small section of automobilists, some of whom do not own cars and perhaps do not drive 50 miles in the year, are lashing themselves into fury at the proposal that motor cars should be numbered, the greater proportion of motorists are longing for the time when every motor car will be seen provided with a suitable badge, by which it may be identified when traveling at high speed.

High powered cars—which, although suitable for the long straight roads of the plains of France, are absolutely unsuitable for use on the winding roads and lanes of England—are being driven about the country by unskilled drivers, and by men who have not the slightest regard for the convenience or comfort of other users of the high road. Accidents are becoming more frequent, yet these men remain unpunished, for the simple reason that the police cannot stop them. It is known that some of these motor blackguards boast that when a constable stands in their way it is their pleasure to run at him and to laugh as he steps on one side to save his life. If by chance they are stopped, they give the card of some unoffending individual who does not even own a motor car. That this is done is proved by a recent occurrence.

In the meantime the public are becoming daily more incensed and the chances of obtaining greater liberty for motorists are becoming more remote. Some journals are adopting an attitude of hostility toward magistrates generally, because they fine motorists heavily for driving at more than 12 miles an hour. It is undoubtedly a fact that there are gentlemen on some benches who are strongly opposed to motors, but it is a mistake to insult the large body of county magistrates generally because of the mistaken attitude of a minority.

Sergeant Jarrott, of the Surrey police force, who has been instrumental in prosecuting as many motorists as anyone, recently stated in court that he did not take out summonses unless the car was going over 18 miles an hour. In spite, however, of very repeated prosecutions and warnings, motor drivers continue to go through Ripley village at an absurdly high speed.

While the club is doing its utmost to obtain greater facilities for motorists, paragraphs are appearing in the press concerning attempts being made to lower the record of 20 hours 28 minutes between Edinburgh and London on the highways, and, indeed, the behavior of a section of the motoring community is such as to be a serious menace to the future of the movement in this kingdom.

It has been suggested that unless the Government immediately brings into force a law providing for the identification of motors, gentlemen who use motors at a reasonable speed, and who drive with proper consideration for other users road, may find it necessary to publi sociate themselves from drivers of cars, road record breakers and othe are bringing automobilists general public disfavor.

As a mater of fact, long ago, the dent of the Local Government Boa advised, if he wished to deal wi motor question really seriously, he commence by prohibiting importati or use in the United Kingdom which are capable of traveling on over a certain speed. It is to be that members of the Automobile Cl make themselves renowned as me drive their cars with due considerat other road users.—*Automobile Club J*

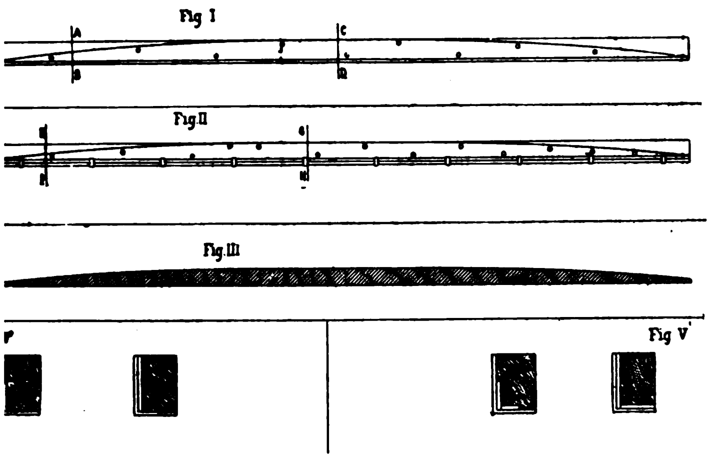
Automobiles for Military Pur

An engineer of the German ar recently made a report upon the advantages of motor vehicles in Dealing with the economics of th tion, he shows that a traction en from 20 to 30 horse power and of weight not exceeding 9 tons could draw five heavy cars at a speed of miles per hour on rough roads ar miles on level roads, with great Thus twenty-one horses would pensed with, as well as ten drivers, their stead one officer and four m engineers and two stokers would The steam engine is preferred to an type of prime motor, as fuel for it is accessible. It is proposed further t steam engine for the motor vehicle be utilizable for providing power fo purposes, notably for the work cranes, for the placing of guns on tlements, for the operating of pum for the driving of dynamos for the ating of electricity to facilitate si and the lighting of camps, as well supplying current for electric mot bread kneading, etc. The report es the introduction of 500 such engin the German army would dispen about 10,000 horses, and reduce t sonnel from 5,500 to 1.000 machini 1,000 firemen.

New French Steel Flitched Frame.

The "armored wood" frame ha substituted for the steel tube fr nearly all manufacturers of autor It is a more rational construction, better adapted to this class of wor beams of which these frames are have thus far been made of a strip plate bent into channel form, wh ceive a filling of beechwood against the steel by means of bolts.

As the stress is greater at the m the beam than at the ends, the same bridge, the vertical parts of the ste nel were made of a height corres to the stress to be supported. The has therefore been made with it



: Reinforced Vertically Only. Fig. II.—Beam Reinforced Both Ver-
nd Horizontally. Fig. III.—Shape of Reinforcing Strip. Fig. IV.—Sec-
3 and C-D. Fig. V.—Sections E-F and G-H.

yond the wood beam about the middle thereof, the height of the channel diminishing ıds.

ıd of construction thus de- t now in general use. While erally very good results, it y inconvenient to fix to the rts for supporting the differ- the brake operating shaft, haft and spring shackles. All enerally require holes through ım or that parts be cut away, es the frame of a good deal h. The method of construc- ı described has for its object he construction of the vehicle, ıt at the same time all the rig- l. The beams have a rectan- over their whole length, the having the same height and dth as the beechwood beam rrounds. To reinforce this ly at the middle a second steel strictly in accordance with the ɔrne is riveted to it, and sunk d. To chassis thus construct- · supporting frame may easily as well as the differential ṣs, spring brackets, etc. The 's are Messrs. Bail-Pozzi, of ɔcomotion *Automobile*.

d Its Effects on Valves.

ılly well known that the valves motors are subject to defor- ıe high temperatures to which ıosed, and that this deforma- erioration requires a periodical the valves to keep them tight. f a valve toward the compres- r, says M. A. Muloux, is often higher mean temperature than ːally opposite side. The flow gases may be more intense or ure of the gases may be higher ɔf the valve toward the cylinder than on the opposite side. It also happens that the off part of the valve chamber acts as a trap for the spent gases and is not cleared by the incoming charge. There are therefore several reasons why the valve has a higher mean temperature at some point on the circumference than at the opposite point. The part heated most will of course expand most radially, measured on the flat side, during the running of the motor.

If the valve is located in the head of the cylinder, coaxial with the latter, an arrangement very rarely met with in automobile motors, the expansion is the same all around the valve and the cause of deformation is eliminated. In certain motors it will happen that the compression, although perfect when the motor is cold, becomes defective after a short time of running. The reason for this phenomenon is that pointed out above. It is obvious that the power of such a motor may be quite appreciably reduced.

These observations have mostly been made on gasoline motors, but, as the tendency abroad is now more or less toward alcohol, some investigations of M. Sorel on the effect of that fuel on valves may not be without interest.

It is often complained that alcohol dirties the intake valve and even gums it to its seat after the motor has stopped, as well as causing the corrosion of the exhaust valve. These effects were noticed during the alcohol motor competition, but only in exceptional cases, the valves of good motors not showing any particular effects. Some admission valves were absolutely clean; others were slightly soiled, with a coating dry and imponderable. Sometimes these valves were covered with lampblack, dry in appearance, but containing traces of liquid carbides which were easily detected by heating in a test tube. Finally, in some motors a deposit of tarry products was observed, and in one case even the presence of at least a cubic centimetre of liquid substances.

With all these differences, says M. Sorel, it seems one cannot denounce the alcohol, as, if it was solely responsible, the same deteriorating effects should be produced on the intake valves of all motors. It is rather to the carburetor that one must look. It is probable that if the alcohol is not vaporized, but only sprayed, the liquid particles which come in contact with the highly heated surface of the valve are decomposed instantaneously and form carbides richer in carbon, as the temperature is higher and the time of contact longer. It seems that thus one may arrive, in the end, at the production of coke.

On the other hand, M. Sorel has always observed the presence of acetic acid in the exhaust products; the relative amount thereof is, however, very variable. Nevertheless, as regards the exhaust valves, the constant presence of acetic acid would seem to lead to the conclusion that the valve surface is continually being attacked.

There is, however, nothing to this, M. Sorel adds, at least not under running conditions. Many of the valves examined did not show the least trace of attack, even when the acidity of the spent gases was quite appreciable. I have encountered but a few cases, which are difficult to connect with each other, of yellowish deposits or yellowish spots, indications of an attack of the metal. Only a single time have I observed a really strong attack of the seat of an exhaust valve.

However, since acetic acid is contained in the exhaust gases, it must be admitted that after the engine is stopped and has cooled the acid may condense and rust the metal. It is thus advisable, after stopping, to lubricate the cylinder and to let the engine make a number of revolutions to prevent the direct contact of the metal of the cylinder wall and the condensed water.

It seems thus that by means of a few simple precautions one may prevent the deleterious effects which have been predicted to result from the use of alcohol and which have been dreaded so much.

The investigations of M. Sorel were conducted as follows:

A hole of 3 millimetres (1/8 inch) was drilled into the exhaust pipe, as near the cylinder as possible, in order to prevent secondary reactions. There was inserted into this drill hole a fine silver tube fitted with a coupling flange of the same material, and the joint was made tight by the interposition between the exhaust pipe and the flange of a packing of moist asbestos. The silver tube was connected by a pipe union to a coil of copper tube passing through a water cooler and ending in a collecting vessel where the condensed products settled. From this collecting vessel led a bent tube with a cock permitting to connect the apparatus to a sealed draw pipe, in which a practically perfect vacuum had been created by means of the mercury pump.

Before taking the sample of the gas the

cock referred to was opened and the motor was operated for a moment in order to expel the air contained in the apparatus by the exhaust gases. Then the tube was connected by means of a rubber tube to the sealed draw pipe, the point or tip of which was then broken off. Only exhaust gases were thus forced into the draw tube, which when filled was closed by means of the blowpipe.

The samples were always taken when running at full load, which condition is the most frequent in actual practice. Care was taken to obtain the sample between two idle strokes. The volume of gas thus secured was about 75 cubic centimetres (5 cubic inches). That of the liquid condensed in the collecting vessel was very variable. Only an average indication of the qualitative composition of the condensable products was thus obtained.

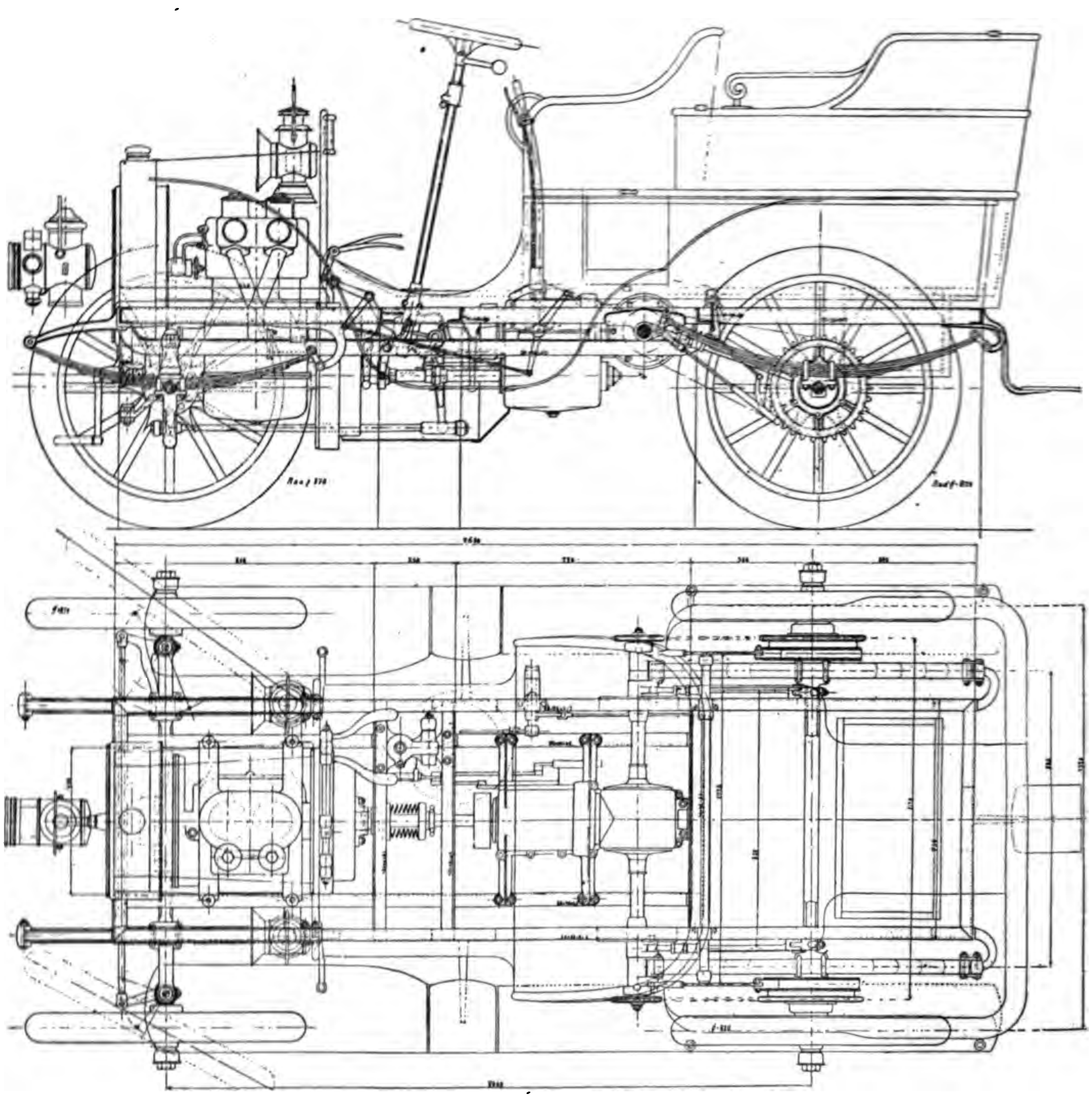
The samples requiring to be taken almost instantaneously to avoid errors caused by idle strokes, the use of large samples could not be thought of and very sensitive apparatus had to be used in the analysis.

In the British Reliability Run ninety-two vehicles were entered, including motor cycles; in the tire contest seven makes of tires, including one American.

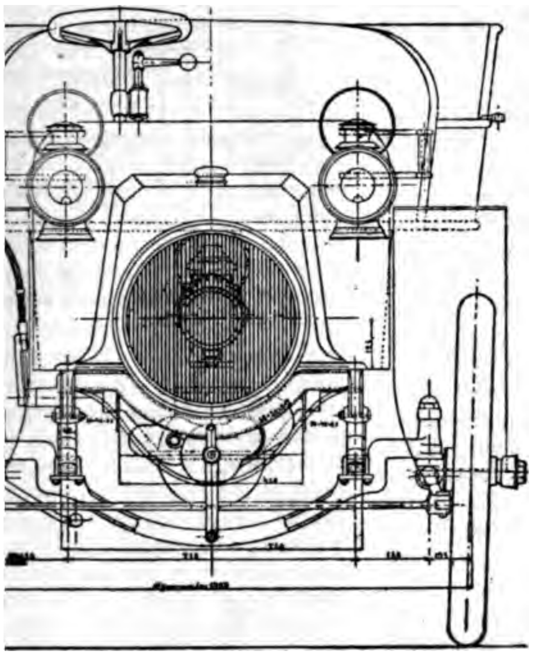
The Kuhlstein-Vollmer Gasoline Carriage.

A little over a year ago we described a vehicle of the Kühlstein Wagenbau Gesellschaft with a double cylinder vertical motor in the seat. Since then new designs of more modern type have been gotten out by this firm and the drawings shown herewith, reproduced from *Der Motorwagen*, represent their 12 horse power alcohol driven tonneau. The motor is a double cylinder one and runs normally at 900 revolutions per minute.

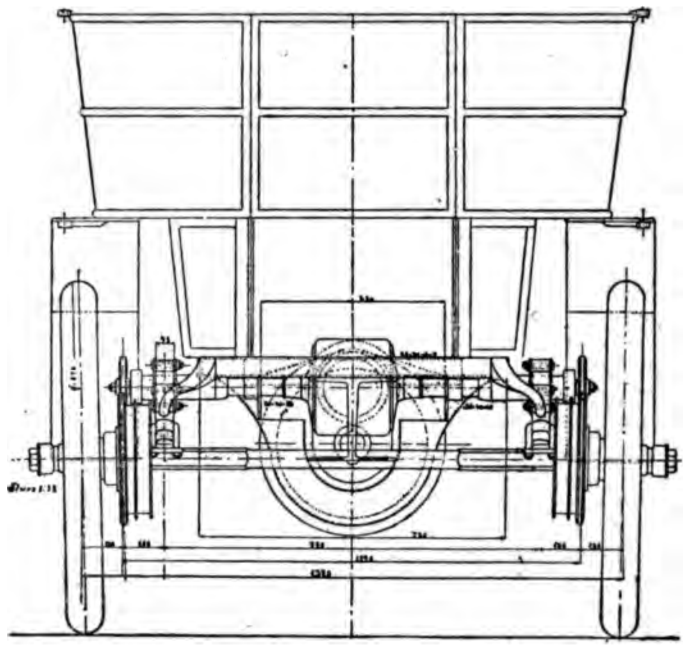
The motor has primary ignition, current being furnished by a magneto. The two



Elevation and Plan of the Kuhlstein Gasoline Carriage.



FRONT ELEVATION.



REAR ELEVATION.

erminals of each cylinder are ›n a single plug, which is readily . The time of ignition is, of riable.

ve and igniter operating parts ·anged that after taking out two : entire valve and igniter oper- :hanism may be removed from · without affecting other parts. ıe speed may be controlled by between the limits of 200 and lutions per minute.

claims are made for a new radial utch, the wearing parts of which able and in which all end thrust l. The removal of four screws take the whole clutch apart, and crew permits adjustment of the a depth of nearly ½ inch is worn he circumference.

r forward speeds—the maximum good level road is about 36 miles reverse are obtained by means of lever supported on the steering The reversing gear can only be when the vehicle is at rest. The ;ears are interlocked—i. e., only can be engaged at any one time. ›tor is lubricated by means of a ıp. The oil supply and the feed 's visible from the seat. As the e pump is operated by the motor, n begins when the motor is start- ıtomatically ceases when the mo- pped. All bearings, with the ex- ıf the motor bearings, are ball and require to be lubricated only

ıtrifugal pump, too, runs on ball and the circulating water is ' means of a novel radiator pre- total of about 4 square metres of surface. The system of tubes is e after a few screws have been , and repairs are therefore easily The cooler will hold about 3½ gallons of water. Air is drawn through the cooler by means of a fan, the same as in the Mercedes machines. The water is filled in at the front of the vehicle, and as cooler and motor are built together in a block only a very small length of pipe is required.

Two pedals arranged one on each side of the steering column will each unclutch the motor when moved through half their range of motion. One of them applies the brake during the last part of its motion, while the other one serves solely for unclutching. The application of the rear wheel brakes also disconnects the motor.

The alcohol tank has a capacity of about 13 gallons, sufficient to cover a distance of 180 miles, it is claimed. Between the filling opening of the tank and the carburetor are inserted a number of wire gauze sieves to prevent the passage of dirt to the carburetor. The amount of alcohol remaining in the carburetor can be read off directly in litres. The fuel is fed to the carburetor by gravity.

The carburetor is of the spraying type, and a gasoline and alcohol carburetor are combined in a single piece. All pipe connections are hard soldered.

The weight of the tonneau, with seats for six persons, is 2,000 pounds. Both front and rear wheels have a diameter of 35 inches. The least distance from the ground of any of the machinery parts is 12 inches. Other dimensions are given in the drawings (in millimetres).

This Kind of Alcohol Not Wanted.

The process of producing alcohol synthetically from calcium carbide is no longer new, but the effect which the process is producing in France is decidedly novel. The elaborate experiments and competitions which have been organized for the purpose of developing the applicability of alcohol to the propulsion of motor vehicles have been undertaken with the intention principally of benefiting the agricultural interest. Various people in the country are now waking up to the fact that agricultural alcohol is likely in the future to find a formidable rival in the chemical alcohol produced from calcium carbide. This is not at all what the promoters of these interesting experiments and competitions desire. An outcry is now being raised therefore in favor of introducing a heavy protective tariff against the importation of calcium carbide. To make the thing complete the movement ought also to demand the establisment of a duty on carbide made in the country, as all that is needed for its manufacture is carbon, lime and electricity. It seems a little hard that a useful industry should be attacked in this way because one of its by-products happens to be a possible competitor with the agricfiltúrist.—*Automotor Journal.*

Uralite.

A Russian artillery officer, Colonel Imchenetsky, has invented a new fireproof composition which he terms uralite. The main ingredient of the substance is asbestos. This is cleansed and afterward mixed with water and chalk, as a binding agent, into a pulp similar to that of paper pulp. The pulp is rolled into sheets, and for the purpose of securing stability a small quantity of silicate of soda is added to it. The sheets thus formed are cut into the sizes required, pressed and dried, leaving boards of fibrous asbestos. These boards are steeped in a solution of silicate of soda, the water is driven off by drying, and they are then dipped in a solution of bicarbonate of soda and again dried. The technical application consists of the impregnation of the asbestos board by silicate of soda and its subsequent decomposition by bicarbonate of soda. This is accomplished by regulating the strength of the two solutions so as

to insure the complete impregnation of the whole of the board by the two chemicals, which are of mineral character. In this way the time of deposition is determined, and, after a sufficiency of the colloid silica is deposited over the fibres of the asbestos, it is gradually dried until the 75 per cent. of water natural to freshly formed colloid silica is driven off, leaving a hard, dense substance, which attaches itself as a cement to the asbestos, and thus forms a homogeneous mass incapable of lamination, with no planes of cleavage, and fire resisting to a high degree. In addition to its being fire resisting, the company claim that uralite is not affected by cold or acid, and thus it may be said to have distinct advantages over corrugated iron. It is supplied for roofings, ceilings, floors and partitions, and can be veneered, varnished and worked with carpenters' tools like ordinary timber.

The German Automobile Club organized a collective automobile excursion from Berlin to Frankfort-on-the-Main during the last week of August on the occasion of the races at the latter place.

In the races at Deanville a motor bicycle was constructed for Demester with a single cylinder motor 114x130 millimetres (4.56x 5.2 inches), the largest bicycle motor that has yet been built, it is said.

There were seventy entries for the automobile races at Frankfort on the Main, Germany, on August 31, including one American, C. Gray Dinsmore, who entered a 40 horse power Mercedes.

The Automobile Club of the Netherlands has removed its club rooms and secretary's office to The Hague, Nassauplein 1B. At a recent meeting the following officers were elected: Dr. J. W. G. Borell van Hogelanden, president; J. L. Nahuys, vice president; H. A. G. Venema, secretary; J. P. Backx, treasurer.

At a meeting of motor cyclists held in Liverpool recently a club, to be known as the Liverpool Motor Cycle Club, was formed. F. H. Wheeler was elected as captain and W. J. Kirkland, 11 Lord street, Liverpool, secretary and treasurer. In the riding season weekly runs and week end tours will be held, and in the winter months meetings will be held, at which members will read papers on the management of motor cycles.

Following upon the adoption of motor parcel mail vans between Manchester and Liverpool a few months ago, the post office authorities have decided, in spite of initial drawbacks which led to the temporary suspension of the system, to extend the system to some of the immediate suburbs of Manchester. Another contract has been let for two vans to run between Manchester and Altrincham and Manchester and Flixton, taking in Stretford and Sale on the former route and Urmston on the latter.

According to the *Automobile Club Journal*, the course at Welbeck, on which Jarrott recently broke the kilometer record, has a down gradient of over 1½ per cent.

La Locomotion Automobile states that gasoline and kerosene fires can be put out by pouring milk over the burning liquid. It would require a demonstration before we place any confidence in this method.

The Actien-Gesellschaft fur Motor- und Motorfahrzeugbau, formerly Cudell & Co., of Aix-la-Chapelle, are being reorganized under the name of the Cudell Motor Gesellschaft, with a capital of 250,000 marks.

Extensive use of automobiles is to be made at the coming Austrian manœuvres. A few weeks ago mechanics from the leading technical corps were sent to the works of some of the leading Austrian manufacturers to be trained as chauffeurs.

In the A. C. G. B. and I. Reliability Contest the motor cycles will be observed by officials stationed at various points, in addition to which the observers on the cars will be instructed to record the stoppage of any motor cycles they may come across.

The International Congress of Tourists' Associations at Geneva, Switzerland, on August 16, discussed the questions of number plates to be affixed to motor cars and cycles in order to facilitate customs inspections. The construction of international roads and hotels was also discussed.

The Daimler Company, of Cannstadt, has now also absorbed the Austrian Daimler Company, and at the latter company's works in the Wiener Neustadt and in the works at Marienfelde, near Berlin, automobiles and street cars on the Serpollet system will be manufactured hereafter.

A sufficient number of entries not having been received, no trial of electrical vehicles will be held by the A. C. G. B. and I. There seemed at one time to be a feeling among constructors of electrical vehicles that the club was not doing sufficient to encourage the electrical side of the movement. A committee, largely composed of those who are engaged in the electrical vehicle industry, was appointed, and this committee advised as to the organization of the trial.

A (gasoline) motor propelled fire engine has been designed and built by M. Batifoulier, a fire engine manufacturer of Besançon, France. The same motor serves for propelling the vehicle (at 10 to 12 miles an hour) and for operating the pumps, which give a jet having a range of over 120 feet and delivering at leas of water per minute. The en five men and their complete eq

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To zinc plate objects by imr recommended to prepare in a porcelain vessel a concentrated chloride of zinc, dilute it with volumes of water, and heat it t If a precipitate should be fo drops of hydrochloric acid are

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A writer in *Motor Cycling* sa possible to conceive a spontane ical ignition meeting the requir perfect ignition system. Such a be operated by the injection in inder at the required moment c charge of phosphoretted hyd which has the property of being ously ignited in the presence mosphere of which oxygen for which is the case in the intern tion motor. Phosphoretted h readily prepared in any acetylen erator by the action of water c phosphide, and owing to its largely used in ships for spo lighting life buoys for use at ni however, only mentioned as an e spontaneous chemical combusti demonstrate that such a form c is not quite so impossible as it first appear.

Air Resistance.

In the high speed railway tes Berlin Zozzen electric road som ing experiments were carried o resistance of the air to moving Pipes were attached to the fro cars and connected to pressur The location and the angle of the of the pipes could be varied, and tions were taken at different spee speed of 32 miles per hour the ai was about 2.7 pounds per squar 37 miles, 4.1 pounds; at 43 miles, at 50 miles, 6.2 pounds; at 62 n pounds; at 75 miles, 15 pounds; a 17.5 pounds; at 93 miles, 23 poun 96 miles, 24.6 pounds. These resu to show that for the speeds test sistance varies according to the the velocity, as has heretofore b but that the coefficients of resist uniformly been too high. From periments it is deduced that air per square foot of impinging su be found by the formula P = This gives results a little over those given by the old air resist based on the coefficient .0049.

Taking the surface of an a equal to 10 square feet, it is seen miles an hour the wind resista pounds. If the car with passenge a ton the traction resistance is pounds on smooth level road, s that speed the air resistance is a quarter of the traction resistance.

NOR
ENTION

ton, Conn., has twelve automo-
present.

day, September 10, the entry fees
. C. A. Reliability Contest are in-
r 10 per cent.

lden Automobile Company has
storage and repair station on
court, Malden, Mass.

d du Lac, Wis., an automobile
uring company with a capital
50,000 has been organized.

and John Goddard, blacksmiths,
street, Spencer, Mass., have
auto station and repair shop.

eported that the Olds Motor
Detroit, Mich., will turn out a
inder machine at $800 for 1903.

nsen Automobile Company, of
Ohio, has changed its name to
al Automobile and Manufactur-
any.

hl Automobile Company have
d operations at Whitney Point,
ding a light gasoline machine at
price.

nber of automobiles registered
Department of Seine (Paris),
capable of over 30 kilometres
3,388.

nobile stage line is to be put in
between Alcaldo and Paso Ro-
and the coast on January 1 next
& Orchard.

York Telephone Company is
ave ordered from the Vehicle
Company a 5 ton electric truck
wires through its conduit.

edo (Ohio) Automobile Manu-
Company, capitalized at $25,000,
be incorporated under the laws
irginia by Geo. L. Lewis and

lville races of the Massachusetts
Club will be held on Septem-
not during the period of the
ndurance contest, as originally

nobile factory is to be built at
Cal., by the Magnolia Automo-
any, of which A. W. Miller is
nd W. L. Moreland mechanical

e steam carriages were recent-
o South Africa, where they will
sed by superintendents of mines.
s will compete in the English
ial this month.

geport dailies report that Au-
IcKelvey, of that city, who has
g his automobile amuck in the city to the terror of his fellow townsmen, is about to be restrained by the appointment of a guardian under bonds to the court. The petitioner is his brother.

The American Motor League is said to have been officially informed that the Meadowbrook causeway on Long Island is a public road and there is no law to prohibit automobile travel on it.

R. B. Holmes, of New York, recently returned from a 1,700 mile trip in a 12 horse power Panhard through the States of New York, Massachusetts, New Hampshire, Maine and Connecticut.

The Berg Automobile Company, of New York, is said to have made arrangements with the Cleveland Machine Screw Company to manufacture automobiles of 8, 12 and 15 horse power of French design.

Negotiations are in progress between the Chicago Motor Vehicle Company and the Business Men's Club, of San Antonio, Tex., regarding the removal of the motor vehicle company's works to San Antonio.

Speed regulations of needless severity, says the *Mail and Express*, will cause regret and discontent among law abiding automobilists, unless they take prompt measures to check the law breaking auto maniacs.

The Interurban Motor Company, which was incorporated at Indianapolis a short time ago with $5,000 capital, has started regular trips with the new automobile 'bus between Garrett, Auburn and Waterloo, Ind.

The Robinson Motor Vehicle Company, Hyde Park, Mass., has changed its name to the Pope-Robinson Company, and the capital stock has been increased from $100,000 to $200,000. The officers remain the same.

Messrs. Gautier and Sacher have started at Cognac, France, a public service of automobiles. The cabmen in the town are furious, and their ordinary language barely suffices to give expression to their sentiments.

In the motor bicycle race on Labor Day a machine fitted with a Kelecom motor and ridden by an amateur came in second with a record of 16 minutes 58 seconds, so we are informed by A. H. Funke, agent for the motor.

C. R. Zacharias, Asbury Park, N. J., has issued a card giving rates for hiring, storing and charging electric vehicles and the distances from Asbury Park to important places that may be reached from there by automobile.

The Kansas City Automobile Club has elected permanent officers, as follows: President, Louis Curtiss; vice president, Ferdinand Helm; secretary, M. C. Albertson; and treasurer, C. F. Lovejoy. Twenty-two members were enrolled at the first meeting.

The Kensington automobile occupied by W. J. Knowles, H. D. Baird, F. D. Thorn and E. H. Frederick, which left Buffalo on August 23, arrived in New York on August 29. An accident near Syracuse caused a delay for repairs. The car ran into a pile of stone in the road and went down an embankment. In backing out the reverse broke.

An automobile line was established between Fort Trumbull and the Croker House, in New London, Conn. The line, which is to continue operations until the close of the manœuvres, comprises a single wagonette leaving the hotel every half hour.

W. H. Kramroth, of Albany, owner of a White steam carriage in which he claims to have made a total of 17,000 miles, on the afternoon of September 1 succeeded in climbing Mount McGregor, a feat which is said never to have been accomplished before.

An automobile manufacturing company with $600,000 capital stock is to be organized at Springfield, Ohio, to manufacture a vehicle invented by Dr. C. W. Russell. Howard Abbott, formerly superintendent of the Leffel Water Wheel Company, will be general manager.

The Washington, D. C., citizens' executive committee on the forthcoming reunion of the G. A. R. has been granted authority by the municipal government to conduct an automobile race over a mile straightaway course and a parade of motor carriages during the encampment.

The Kensington automobile which made the run from Buffalo to New York, as reported elsewhere, is equipped with a Kelecom motor, and, as a result of this performance, we are informed the Kelecom motor will be used exclusively on the Kensington machines in the future.

According to the daily papers W. K. Vanderbilt, Jr., who has made more attempts at breaking automobile records than any other American, has lost his interest in the automobile since the shocking death of Mr. and Mrs. Fair and will abandon the pursuit of this dangerous form of pleasure. Subsequent events disproved the rumor, however, for the young man was arrested in Newport shortly afterward and fined $10 for illegal speeding, the magistrate administering, in a serious talk to the delinquent, a much needed lesson.

C. H. Page and H. C. Moore, of New York, made a run from Herald square, New York, to Philadelphia and return in an Oldsmobile on August 31. The run to the Quaker City was made in 7 hours 38 minutes and the return in 6 hours 27 minutes, including all stops. The route covered by odometer measurement was 103 miles going and 103¾ miles returning. The route taken was by way of Newark, Elizabeth, New Brunswick, Hightstown and Camden both ways. The road was reported good all the way except the 15 miles between Cranberry and Bordentown. Two punctures, one at New Brunswick and the other at Philadelphia, caused an aggregate delay of nearly an hour. An injury to the

hose circulation was the only trouble reported with the machine itself.

Dr. O. S. Roberts opened his new storage and repair station at Pittsfield, Mass., recently.

Tom Johnson, mayor of Cleveland, will conduct his State campaign this fall in an automobile, it is reported.

Ware's automobile station at 36 and 38 Winthrop street, Salem, Mass., opened for business last week under the management of P. Joseph Wrin.

The Spaulding Automobile Manufacturing Company, of Buffalo, are negotiating with the town of Port Huron, Mich., with a view of locating there.

An automobile club was organized at Topeka, Kan., on August 29. J. M. Podgett has been elected temporary chairman and R. D. Montgomery temporary secretary.

The Westfield Motor Company, of Anderson, Ind., has filed articles of incorporation with a capital stock of $150,000. The object is general manufacturing. The directors are Albert H. Sears, Granville G. Westfield and William C. Vanneman.

A National Bureau of Standards is to be established at Washington, D. C., by the United States Government at a cost of over $1,000,000. Work has just been begun on the first building, the mechanical laboratory.

The Meteor Engineering Company, of Reading, Pa., on September 4 elected the following board of directors: E. W. Alexander, D. P. Schlott, E. S. Youse, W. T. Hain, O. S. Geiger, M. D. Hunter, J. Milton Miller. The board selected the following officers: President, E. W. Alexander; vice president, J. Milton Miller; secretary and manager sales department, E. S. Youse; treasurer, D. P. Schlott; general manager, I. D. Lengel. The company will manufacture the "Reading" steam carriage and a new model under the name "Meteor."

A trip from Lynn, Mass., to New York was recently completed by Geo. J. Collins in a steam machine in 18 hours 55 minutes, the distance being 280 miles. This gives an average speed of 14.8 miles per hour. The route was via Worcester, Springfield, Hartford, New Britain, Meriden, New Haven, Bridgeport, etc. Starting from Lynn at 2:50 a. m. Tuesday, August 26, he reached Springfield at 8 a. m., having been delayed forty minutes at Malden to repack the water glass. At New Haven forty-five minutes were lost in packing an eccentric. Arriving at Bridgeport at 4 p. m., he had seven hours remaining to make 60 miles. At Stamford, 20 miles west of Bridgeport, the safety valve broke and all the steam was released. After vainly attempting to get repairs, a plug was screwed in and the machine was soon again under steam. This consumed over two hours more. The remainder of the run was made without a safety valve. The goal was reached at 9:45 p. m.

The Automobile Club of St. Louis.

We have received a copy of a booklet containing the constitution and bylaws, list of officers and of members of the recently organized Automobile Club of St. Louis. The first official steps looking toward the formation and incorporation of the club were taken on May 29 last. The number of members listed is fifty-three and the following officers have been elected for the first year: G. H. Walker, president; Dr. Jules F. Vallée, vice president; Edward Mallinkrodt, Jr., treasurer; Dr. E. M. Senseney, secretary. The board of governors includes, besides the above, Horace Rumsey, Geo. B. Leighton, A. W. Niedringhaus, John Ring, Jr., and John Carter.

The objects of the club, according to the constitution, are to form and maintain an organization, the membership of which shall be composed in whole or in part of persons owning motor vehicles or automobiles for personal and private use, and which organization shall provide for the education of its members and of the public in the mechanical sciences pertaining to the construction and skillful use or management of motor vehicles; to promote original investigation in the mechanical development of motor vehicles; to furnish a means of recording the experiences of members and others in the use of motor vehicles, and to collect and distribute such information relative to motor vehicles and to the construction and maintenance of good roads and streets as will be useful and tend to the advantage of the members and the public; to arrange for pleasure runs and to encourage contests of all kinds among the owners of motor vehicles; to co-operate, aid in and encourage the establishing of such rational rules, regulations and customs in the use and management of motor vehicles as will be conducive to the well being of the members and the public; to encourage the construction and maintenance of good roads and the improvement of public highways, and generally to maintain an organization for promoting the art and sport of operating and running automobiles; and for the accomplishment of these objects this corporation shall have the power to establish and maintain a club house or club rooms affording facilities and inducements for bringing together the members in frequent intercourse for such purposes, and shall have the power to acquire and hold such personal and real property as may be necessary to carry out these objects.

The Dayton Automobile Club.

A copy has been received of the constitution and bylaws of the Dayton (Ohio) Automobile Club, of which Carl L. Bauman is president, Dr. A. F. Bowman vice president, Dr. W. Webster Ensey secretary-treasurer and Frank P. Hilt road captain.

The objects of the club are stated to be the promotion of a social organization or club composed in whole or in part sons owning self propelled pleasur cles for personal or private use; to a means of recording the experie members and others using motor v or automobiles; to promote origi vestigation in the development of carriages; to co-operate in securi tional legislation and the format proper rules and regulations govern use of automobiles in city and c and to protect the interests of own users of automobiles against unjust reasonable legislation, and to maint lawful rights and privileges of ow all forms of self propelled pleasure v whenever and wherever such righ privileges are menaced; the encoura and development in this country of tomobile; to promote and encourag ways the construction and mainten good roads and the improvement o ing highways, and generally to mai social club devoted to automobilism

Following is a list of the member L. Bauman, Frank P. Hilt, John Earl H. Kiser, E. F. Platt, Dr. A. F man, Dr. G. W. Miller, Dr. G. A. walt, Dr. C. A. Bonner, Dr. W. W Ensey, John S. McIntire, E. A. Ho Harvey Loy, Henry Coleman, Robe terson, J. D. Platt, Jr., Ferd. J Charles Crist, Vincent G. Apple, Be faber, C. B. Wolf, Edward Re Claude C. Hooven, James Cox, K Jewell, Edgar M. Thacker, Charles B. M. Hopkins, John McGregor, Schenck, R. W. Martin, Harry (John Rock, George Andress, A. W. E. C. Harley, George G. Peckham, Keyes, Jacob Ritty.

Hill Climbing Test of Brid Club.

The Bridgeport Automobile Club hill climbing contest on Labor I Sport Hill, which is about ¾ r length, with an average grade of al per cent. The condition of the h good and well fitted for the contest, roadway was hard and there was no dust. Farmers living near the hi mated that it took one of their usually about fifteen minutes to asc hill, while some of the automobiles c it in a seventh of that time.

Great interest was manifested in t test by those living in the vicinity hill, while there was a large number tomobiles present from Bridgeport neighboring towns.

The entries were divided into classes, comprising the heavy gasoli of over 1,000 pounds weight, the lig oline cars under that weight and th carriages. There were ten entrie gether, five in the heavy gasolin two in the light gasoline class and t the steam class. Of this numbe competed.

ime and character of entries are as

r Gasoline Class—No. 2, L. B. Curnton), 4m. 57s.; No. 7, Jonathan (Peerless), 5m. 31s.; No. 1, DeVer ner (Winton), 5m. 38s.; No. 6, H. long (Columbia), 6m. 45s.

Gasoline Class—No. 5, J. B. CorneDion), 9m. 9s.

1 Class—No. 3, E. B. Sloan (loco-, 2m. 40s.; No. 8, George Carlston bile), 3m. 22s.; No. 4, N. B. Dowd bile), 4m. 19s.

Chicago A. C. Races.

Chicago Automobile Club will hold at Joliet, Ill., on Saturday, Sep 27. There will be eleven events. es will be divided into classes ac- to specific power, as follows: Class o .5 horse power per 100 pounds cle weight; class 2, .50 to .70 horse class 3, .70 to 1 horse power. The power is to be based upon the cylore only and the motors will be s follows: Power per cylinder of 3 bore, 2.54 horse power; 3½ inches, orse power; 4 inches, 4.52 horse 4½ inches, 5.72 horse power; 5 7.06 horse power; 5½ inches, 8.65 power.

list of events is as follows: (1) 1 am, stock machines only; (2) 1 mile , open to all; (3) 5 mile steam, (4) 5 mile gasoline, class .35 to .50; nile motor bicycle handicap; (6) 10 soline, class .50 to .70; (7) 10 mile e. class .70 to 1; (8) 10 mile open, es. all weights, all classes; (9) purce. class .35 to .50, thirty minutes; mile handicap, 1 mile limit; (11) race, members C. A. C.

ivers for American Bicycle Company.

e Andrew Kirkpatrick, of the United Circuit Court, has appointed Presi- . L. Coleman, A. A. Pope and John ller receivers for the American Bi-Company. The liabilities of the com- nclude $5,000 due to the National r Company and $50,000 due the Fedanufacturing Company.

company was organized in 1899 and paid up capital stock of $26,998,400. il January of last year the company tively engaged in the manufacture le of bicycles, but on the latter date me a mere "holding company," ac- g to the bill of complaint, having rred its operations and assets to sub- corporations.

ng the assets of the company are: stock American Cycle Manufacturmpany, $4,000,000; capital stock Inonal Motor Car Company, $800,000; stock Federal Manufacturing Com- $2,000,000; capital stock National r Company, $50,000. These stocks be availed of for the purpose of g current obligations, it is stated in l.

It was stated that the business of the subsidiary companies would in nowise be affected by the passing of the parent company into the hands of receivers.

A committee is said to have been appointed to reorganize the company's affairs, composed of Geo. F. Crane, W. A. Read, Geo. W. Young, F. S. Smithers and Colgate Hoyt.

Races at Rockport, Ill.

A series of automobile races were held by the Chicago A. C. at Rockport, Ill., on September 5.

The first event was the 5 mile open, flying start. A. C. Banker, who was accompanied by A. C. Phelps, of New York, had the pole. John D. Fry and B. C. Hamilton in the former's machine drew second position, and John Farson, Jr. (Winton), had the outside. Farson cut out a fast pace and quickly took the lead. He negotiated the 5 miles in 11m. 57⅘s. Fry finished second and Banker third.

In the 3 mile handicap Farson was placed at scratch, Fry was given 1-6 mile and Banker ⅓ mile. Farson won handily in 6m. 39s. Fry's time was caught at 6m. 59s.

In the 1 mile handicap Farson's machine was again placed at scratch. Fry was given 1-12 mile and Banker 1-6 mile. Fry retained the lead to the end, but the finish was a better one than the other events afforded.

Lowering Records in Connecticut.

An alleged attempt by Wm. N. Beach, of New York, to lower the record time between Stamford and New York city in a 40 horse power machine recently purchased at a record price, was stopped at Put's Hill, Conn., by the deputy sheriff of Greenwich by means of a rope stretched across the road and at the point of a revolver. The machine was driven through Stamford at a high rate of speed and the chief of police of that city telephoned to the sheriff of Greenwich, who made his preparations to intercept the racers. When the driver saw the rope he stopped, whirled the machine around and proceeded to run back, but was covered by the deputy sheriff with a revolver. The driver was arrested, but was released upon the promise of Mr. Beach to have him at Stamford in the evening. The matter was settled out of court later on by Beach paying a fine of $50.

Washington Races.

With regard to the automobile races at Washington, D. C., the present plans are that the race shall occur on Fifteenth street Northwest, beginning just above U street and ending at I street, with a sufficient space at the head of the street for a "running start," and at the end of the course—in front of the Arlington Hotel—for the carriages to come to a full stop. The contestants will race in preliminary heats of two carriages each, with semi-finals and finals for the winners in the preliminaries.

New Version of the Fair Accident.

The New York *Evening Sun*, of September 9, contains a dispatch from San Francisco in which a somewhat new and sensational account is given of the recent fatal accident to Mr. and Mrs. Charles L. Fair at Pary-on-Eure, France. The information purports to come in a letter from a young Englishman traveling in France, who, with a friend, happened upon the scene of the accident soon after it occurred and interviewed the gamekeeper's wife, the only witness to the accident. The writer says:

"From what we heard, something went wrong with the steering gear, as we were told that the pivot or volant belonging to the wheel was found in the high road at the rear of the car and before it struck the tree. Anyway, Mr. Fair was driving too quickly, but not at a higher rate than 80 kilometres an hour. But one can meet death at a slower rate of speed.

"The report is current that the fact of discovery of the steering wheel pivot in the road was kept secret through the efforts of the French automobile manufacturers."

Those who knew Charles Fair disbelieve the published stories of the accident, for they are all written on the assumption that he was not a skilled chauffeur, whereas he was a born machinist and he knew much about automobiles, having built one in San Francisco himself.

Sale of the Plant of Automobile Company of America.

The plant at Marion, N. J., and entire property of the Automobile Company of America were sold at public auction on Monday, September 8. Included in the sale were a number of gasmobiles, finished and in an incomplete state. The sale was well attended by persons who supposed there would be an opportunity to bid for individual machines, but purchase of the entire property was effected by the law firm of Philbin, Beekman & Menken, of 111 Broadway, New York, acting in the matter for one of their clients. The purchase price was $100,000.

Trade Literature Received.

Palmetto Self Lubricating Packing—Greene, Tweed & Co., of 17 Murray street, New York.

International Tires—International A. & V. Tire Company, of Milltown, N. J.

Tires (book of testimonials)—International A. & V. Tire Company, of Milltown, N. J.

List Showing Stock of Brass and Copper in Sheets, Tubes, Wire and Rods—Waterbury Brass Company, of 122 Centre street, New York city.

Toledo Gasoline Touring Car—International Motor Car Company, of Toledo, Ohio.

The Toledo Kerosene Burner (also Toledo Boiler Compound) — International Motor Car Company, of Toledo, Ohio.

List of Automobile Owners as Filed in the Office of the Secretary of State, at Albany.

(Concluded.)

Wickes, T. H., Jr., 257 West 111th street, New York city.
Wierck, John P., 500 Broadway, Brooklyn, New York city.
Wise, Charles, 56 Lind avenue, New York city.
Warren, Richard H., 645 Madison avenue, New York city.
Wood, Alan W., 40 Riverside street, New York city.
Wright, Oliver H., Geneva, N. Y.
Whitlock, W. P., 637 North Broad street, Elizabeth, N. J.
Washington, William Lanier, 45 West Thirty-fourth street, New York city.
Whitney, E. Barton, Gloversville, N. Y.
Warwick, Harry T., Amsterdam, N. Y.
Wright, W. J., 432 Pearl street, Buffalo, N. Y.
Williamson, W. W., Palmyra, N. Y.
Wylie, John, 560 West Twenty-fifth street, New York city.
Wood-Harmon Co., 257 Broadway, New York city.
Wixson, George B., Elmira, N. Y.
Wallace, E. K., Tuxedo Park, N. Y.
Wenman, B. W., 34 East Sixty-first street, New York city.
Williams, W. E., 408 Hancock street, Brooklyn, New York city.
Weller, William, 44 Millford avenue, Newark, N. J.
Watts, Dr. James, Kings and St. Mark's avenue, Brooklyn, New York city.
White, Major A., 42 Cedar street, New York city.
Weesebrock, R. E., Arverne by the Sea, Long Island, N. Y.

Yelverton, James W., Schenectady, N. Y.

Zinax, L., 385 South Pearl street, Albany, N. Y.
Zollickhofer, O. F., 49 West Fifty-fourth street, New York city.
Zahnskie, A. L., 195 Lexington avenue, Passaic, N. J.

List of Automobilists Registered in Chicago.

Arthur J. Eddy, 1635 Sheridan road.
W. E. Phillips, 3635 Michigan avenue.
M. L. Swift, 4418 Ellis avenue.
Edward B. Grossman, 3714 Grand boulevard.
Herman Grossman, 3924 Grand boulevard.
C. F. Green, Virginia Hotel.
F. R. Johnson, Lexington Hotel.
William H. Wilson, 1470 North Halsted street.
Clarence F. Wiley, 4811 Kimbark avenue.
E. B. Martin, 2702 Michigan avenue.
J. R. Tompkins, Hawthorn Race Track.
Julia H. Hoffman, 301 East Fifty-sixth street.
Warren McArthur, 4852 Kenwood avenue.
H. B. Conkling, 168 East Forty-fifth street.
Frank E. Mather, 205 Cass street.
Vittrice Thomas, 60 Woodlawn Park.
T. W. Clifford, Auditorium Annex.
William A. Brett, 977 North Clark street.
William McLain, 3027 Dearborn street.
R. H. De Launty, 5762 Dearborn street.
Harry M. Chambers, 296 Park avenue.
J. H. Fahrney, 1074 Warren avenue
Miss A. Richardson, 47 Bellevue place.
J. C. Sayles, 313 Michigan avenue.
William R. Kelley, 2129 Calumet avenue.
William E. Walker, 365 Ontario street.
G. W. Betts, 191 Walnut street.
Sam E. Thrall, 4620 Woodlawn avenue.
Fritz Glogauer, 2532 Kenmore avenue.
William Roulet, 7728 Eggleston avenue.
D. McKenzie, 6109 Drexel boulevard.
J. W. Hayden, Oak Park, Ill.
W. H. Fahrney, 1074 Warren avenue.
W. H. Brown, 725 Pullman Building.
W. S. Brewster, Union Club.
Thomas P. Hamm, 4512 Grand boulevard.
James L. Mead, Highland Park, Ill.
Charles E. Hammerly, 931 Van Buren street.
J. W. Hayden, 6113 Kimbark avenue.
William Carson Long, 4823 Kimbark avenue.
Warren McArthur, Jr., 4852 Kenwood avenue.
Frank J. Whitelaw, Oak Park, Ill.
C. Blair, 4830 Drexel boulevard.
S. M. Walker, 90 State street.
Frank Hiffler, 2428 Michigan avenue.
Mrs. Edith Cooke, 5818 Prairie avenue.
A. E. Adams, 278 Wabash avenue.
T. J. Pardee, 6045 Jefferson avenue.
Richard H. Wells, Kenosha, Wis.
W. D. Himrod, 197 South Wood street.
Mrs. Jack Fuller, 134 East Forty-seventh street.
Jesse W. Sunderland, 748 Jackson boulevard.
Edwin C. Brayley, 4210 Evans avenue.
E. W. Meck, 5629 Washington avenue.
F. W. Perkins, Calumet avenue.
J. A. Farwell, 2506 Michigan avenue.
William M. Jewele, Winetka, Ill.
Frank H. Davis, Berwyn, Ill.
E. J. Day, 563 Orchard street.
Herbert C. Douns, 319 Ashland boulevard.
Charles W. Gray, 1607 Adams street.
Robert Wilson, 6056 Monroe avenue.
A. J. Miliman, 126 Dearborn street.
J. D. Fischer, 1588 Kenmore avenue.
Ogden F. McClung, 125 Lake Shore drive.
Gus Hunstack, 212 Homer street.
John Sell, 559 Sedgwick street.
W. A. Boal, 732 Michigan avenue.
James Schmidt, 125 West Erie street.
G. E. Sparks, 4759 Calumet avenue.
W. D. Foerman, 992 Adams street.
W. W. Robinson, 1676 Grenshaw.
Charles S. Winslow, 7 Gordon terrace.
Maurice Wolfe, 293 Wabash avenue.
Bert M. Young, 1206 West Adams street.
C. B. Babcock, 147 Pine street.
Morris Vehon, 3638 Grand boulevard.
Otto V. Bachella, Winetka, Ill.
B. F. Harris, Champaign, Ill.
F. B. Babcock, 11 Bellevue place.
William R. Osell, 145 Lincoln Park boulevard.
William E. Railslack, 222 Twenty-second street.
John R. Magill, Chicago Beach Hotel.
J. K. Robinson, Chicago Athletic Club.
Britton Lane, 1354 Michigan avenue.
J. F. Palmer, 900 Royal Insurance Building.
J. S. Beaudry, 7047 Princeton avenue.
L. D. Sheppard, 108 Loomis street.
Norman Williams, 1836 Calumet avenue.
Harry W. Kane, 355 Wabash avenue.
M. Irvin Latt, 4418 St. Lawrence avenue.
Charles P. Champlain, 4342 Drexel boulevard.
L. O. Van Ripper, Highland Park, Ill.
Frank Northelfer, 3210 Prairie avenue.
M. B. Pine, M. D., 68 East Forty-second place.
Louis E. Laflin, 369 Erie street.
Charles F. Yerkes, 3201 Michigan avenue.
John D. Caldwell, 22 Fifth avenue.
Charles A. Caspers, 831 West Forty-seventh street.
B. H. Marshall, 4730 Drexel boulevard.
T. W. Loveless, 309 Twenty-fourth street.
Mrs. W. Counselman, 383 East Superior street.
F. E. Drake, Kenwood avenue.
J. A. Drake, Kenwood Hotel.
A. W. Woodward, 5200 South Park avenue.
G. H. Atkin, 5039 Jefferson avenue.
Frank F. Auten, 314 Ashland boulevard.
F. M. Homer, 279 Franklin street.
George F. Glover, 1847 North Ashland avenue.
L. C. Tuller, 112 Dearborn street.
W. F. Homan, 428 West Adams street.
C. F. Bartley, 931 Unity Building.
Charles W. Gillett, 8 Board of Trade.
Charles Rupert, 166 East Harrison street.
H. H. Porter, 311 Erie street.
Alford F. Leopold, 3339 Michigan avenue.
Irving R. Hall, Oak Park, Ill.
Mrs. G. V. Davis, 3653 Grand boulevard.
King Upton, Salem, Mass.
A. J. Conway, 370 Wabash avenue.
W. R. Donaldson, 370 Wabash avenue.
Otto Cullman, 42 Burling street.
I. C. Bronson, 2362 North Paulina street.
W. Vernon Booth, 31 Bellevue place.
H. M. Hoelscher, 93 West Lake street.
A. Sanderson, 5211 Cottage Grove avenue.
C. H. Mattiesson, 4917 Drexel boulevard.
Edward Manierre, 397 East Superior avenue.
Miss C. Neely, 4929 Greenwood avenue.
J. H. Fool, 549 Washington boulevard.
Joseph Ledwinke, 4349 Ellis avenue.
L. E. Myers, 1117 Monadnock Building.
Owen Murphy, 1207 Tripp avenue.
Louis Schram, 3358 South Park boulevard.
H. A. Gasporo, Austin, Ill.
Mrs. Bruce Clark, 139 Lincoln Park boulevard.
C. R. Childs, 3619 Calumet avenue.
H. M. Brinkerhoff, 149 Ashland boulevard.
H. S. Oakley, 565 Dearborn street.
A. B. Chandler, 182 Rush street.
R. D. Markham, 46 Elaine place.
May L. Schlesinger, Wilmette, Ill.
C. B. Young, 4727 Woodlawn avenue.
J. B. Murphy, 3305 Michigan avenue.
F. A. Stewart, 146 Forty-second place.
A. W. Goodrich, 1474 Michigan avenue.
J. D. Worth, 370 Wabash avenue.
W. O. Worth, 370 Wabash avenue.
Ernest Morgan, 1093 Washington boulevard.
Max Law, 847 Winthrop avenue.
Charles Dickinson, Chicago Dock Company.
Paul Kraemer, 444 Lincoln avenue.
B. P. Spiegler, 151 Potomac avenue.
E. W. Lilienfeld, 3649 Prairie avenue.
W. E. Mack, 767 Washington boulevard.
George S. Isham, 488 North State street.
F. B. Merrill, 6035 Jefferson avenue.
H. P. Skiles, 963 Monroe street.
C. E. Thackery, 284 Wabash avenue.
F. R. Blain, 3967 Drexel boulevard.
John E. Jenkins, 2625 Prairie avenue.
J. Blain, 3967 Drexel boulevard.
Charles G. Gates, 2944 Michigan avenue.
Mrs. Edward Morris, 4500 Michigan avenue.
Miss Fannie E. Slade, 4401 Champlain avenue.
W. B. Conkey, 5518 East End avenue.
Mrs. Mary D. Able, 3800 Dearborn street.
E. G. Jacques, Oak Park, Ill.
Mrs. C. E. Jacques, Oak Park, Ill.
J. F. Paulin, 153 Palmer square.
John P. Quinn, 1303 Michigan boulevard.
Edward Morris, 4500 Michigan boulevard.
Arthur Morrison, 270 East Chicago avenue.
A. G. Huizinga, 11,054 Michigan avenue.
N. G. Harris, 1691 Kenmore avenue.
J. S. Stone, 10 Aston street.
W. G. King, 11½ Lane court.
Frank A. Lathrop, Hollenden Hotel.
Edwin F. Brown, Evanston, Ill.
Ross Judson, 3643 Indiana avenue.
George H. Ellis, 1142 Dunning street.
Burton C. Hamilton, 635 Garfield Building.
F. C. Gifford, 4637 Drexel boulevard.
Frank S. Johnson, 2521 Praire avenue.
W. W. Doolittle, 1251 Winthrop avenue.
P. McPherson, 2601 South Halsted street.
H. K. Holsman, 153 La Salle street.
W. W. Keith, 1904 Prairie avenue.
Harrison Musgrave, First National Bank Building.
James Keith, 2593 North Winchester avenue.
J. E. King, 135 Pine street.
Frank Mudd, Austin, Ill.
Francis E. Ingalls, 4757 Grand boulevard.
E. A. Johnson, 1170 Millard avenue.
F. Robert Zeit, 4061 Vincennes avenue.
George A. Haskell, 557 Washington boulevard
R. Ortman, 39 Cedar street.
Louis Greenberg, 239 Bissell street.
Bruce Clark, 139 Lincoln Park boulevard.
Francis Milas, 2944 Michigan avenue.
Ford Gates, 2231 Indiana avenue.
J. E. Haschke, 589 Monroe street.
H. R. Bucklin, 265 Michigan avenue.
K. Valiquet, 225 Rush street.
W. J. Noble, 3000 Michigan avenue.
W. R. Smith, 3920 State street.
W. G. Miller, Chicago Beach Hotel.
J. W. Hendrick, 6718 Sangamon street.
David Cottrell, 264 East Ohio street.
C. B. Slade, 4401 Champlain avenue.
Edward J. Doering, Metropole Hotel.
L. M. Grant, 3982 Ellis avenue.
John J. Wolff, 93 West Lake street.
Oscar J. Friedman, 5132 East End avenue.
Robert J. Zorge, 1087 Winthrop avenue.
M. E. Cooke, 5818 Prairie avenue.
O. M. DeLauntey, 399 Randolph street.
John Spengler, 585 North Clark street.
A. P. Gilmore, 4948 Woodlawn avenue.
Elizabeth Spry, 4849 Ellis avenue.
E. M. Mulford, Jr., 3244 Beacon street.
W. W. Weare, Morton Park, Ill.
Harry J. Powers, 4843 Grand boulevard.
Robert Shaw, 235 Washington boulevard.
F. R. Jenkins, 5610 Madison avenue.
J. E. Scully, 364 Campbell avenue.
Adelaide Metzger, 3006 Groveland avenue.
A. C. McCord, 600 North State street.
I. H. Mayer, 4700 Kimbark avenue.
Mrs. I. H. Mayer, 4700 Kimbark avenue.
Lindell Darbey, 1904 Prairie avenue.
John F. Ross, Oak Park, Ill.
Carl Anderson, Jr., Winetka, Ill.
Gus. Wright, 3921 Grand boulevard.
John Cudahy, 3254 Michigan avenue.
J. D. Adams, 5011 Grand boulevard.
R. B. Price, 27 Delaware place.
E. W. Walseo, 312 South Central avenue.
Mrs. L. D. Ferguson, 1401 Davis street, Evanston, Ill.
Mrs. Herbert L. Swift, 4120 Grand boulevard.
C. H. Tobey, 4837 Kenwood avenue.
E. J. Hopkins, 606 Park avenue.
E. J. Schmitt, 4537 Drexel boulevard.
J. Frank, 3354 Wabash avenue.
J. W. Cleveland, 6500 Evans avenue.
Calvin E. Defenlan, 4547 Grand boulevard.
Henry G. Hart, 4346 Vincennes avenue.
S. Mayer, 525 Cleveland avenue.
Leonard Davis, 213 Wood street.
Earl C. Bradley, 3605 La Salle avenue.
A. R. Riegosch, 1214 North Spalding avenue.
Walden W. Shaw, 5227 Cornell avenue.
L. D. Shely, 4333 Greenwood avenue.
Victor C. Colby, Harvey, Ill.
A. B. Hayden, 198 South Wood street.
C. F. Dunbar, 35 Kieth street.
Alfred S. Austin, Hotel Metropole.
J. W. Duntley, 583 Forty-fifth place.
W. B. Smith, 2140 Prairie avenue.
W. O. Duntley, 688 Forty-eighth place.
Bessie E. Darling, 105 East Forty-seventh str
P. L. Mabb, 247 Warren avenue.
S. F. Marchant, 4366 Oakenwald avenue.
J. S. Bridges, 234 East Forty-seventh street.
Mrs. E. V. Rodden, 137 Pine street.
W. R. Gibbs, 2505 Michigan avenue.
Potter Palmer, 100 Lake Shore Drive.
H. S. Blake, Racine, Wis.
F. H. Clark, Evanston, Ill.
C. J. Trayner, 4426 Grand boulevard.
F. K. Johnson, 4527 Greenwood avenue.
W. J. Hilands, 2918 Michigan avenue.
W. D. Huston, 1141 Washington boulevard.
F. D. Abbott, Thirty-ninth street and Ellis avenue.
Frank Nitteberg, 3022 South Park avenue.
W. B. Preston, 5011 Grand boulevard.
C. A. Plamondon, 413 Warren avenue.
M. C. Robbins, 5245 Cornell avenue.
Van Rensselaer Lanisingh, 5327 Kimbark aver
Charles D. McKee, 121 Fifty-fifth street.
Milton Wilson, 4613 Drexel boulevard.
S. M. Wiley, 171 East Forty-seventh street.
Charles Hoffman, 5631 Dearborn street.
Henry Plohr, 2827 South Park avenue.
Espey L. Smith, M. D., 974 West Polk street.
Dr. William S. Hendricks, 927 West North avenue.
William P. Dole, 2756 North Lincoln avenue.
Bess. Bigelow, 249 East Forty-ninth street.
Edwin Austrian, 4047 Grand boulevard.
Margaret W. Lord, 4857 Greenwood avenue.
Karl O. Jones, 3140 Prairie avenue.
Paul M. Hotchkiss, 4031 Lake avenue.
A. W. Holmes, 717 Royal Insurance Building
Mrs. C. M. Hochkin, 4981 Lake avenue.

Mrs. G. E. Shuman, 353 Ashland boulevard.
Louis F. Roenitz, 363 Ashland boulevard.
J. J. Walser, 312 South Central avenue.
D. J. Gilleland, 1327 Church street, Evanston, Ill.
Clarence Bauer, 1287 North Halstead street.
E. W. McGready, 428 North Kenilworth avenue.
John Benham, 2415 Michigan avenue.
Elmer Roberts, Palatine, Ill.
O. A. Barker, Auditorium Annex.
Miss E. U. Wiley, 171 East Forty-seventh street.
Mrs. R. Artman, 39 Cedar street.
James F. Lord, 1901 Indiana avenue.
L. Fairbank, 1801 Michigan avenue.
A. D. Clark, Greenwood Inn, Evanston, Ill.
B. G. Sykes, 1354 Michigan avenue.
P. J. Ryan, Auditorium Annex.
A. W. Walsh, 4441 Ellis avenue.
Henry Botto, 42 Hope street.
E. M. S. Fernandez, 3243 Malden avenue.
Martin H. Hanson, 1558 North Talman avenue.
W. J. McAuley, 623 Larrabee street.
William A. Doer, 142½ North Clark street.
James Donsman, 1410 Michigan avenue.
M. N. Mayer, 541 Jackson boulevard.
W. J. Carney, 4218 Grand boulevard.
S. Harmstrom, 1817 Melrose street.
John F. Plummer, Jr., Chicago Beach Hotel.
Dr. A. C. Heister, 1775 West Twenty-second street.
Clifton F. Mason, 719 Washington boulevard.
Earl H. Deakin, 413 Warren avenue.
F. Westerman, 1639 Briar place.
Charles E. Smith, 370 Wabash avenue.
Edward Jensen, 2625 Prairie avenue.
H. W. Robinson, Maywood, Ill.
Dr. A. E. Beneling, 511 Ashland boulevard.
Charles E. Tunelins, 1034 South Lincoln street.
Frank Thompson, 1191 Laundale avenue.
Mrs. Charles C. Painter, 117 East Forty-ninth street.
Jay C. Kills, 1536 Windsor avenue.
George D. Richards, 135 East Fifty-first street.
John A. Clark, 926 Judson avenue, Evanston, Ill.
Le Roy Koons, 929 South Sawyer avenue.
Clarence Mack, 306 Shiller street.
Stanley McCornic, 135 Rush street.
George S. Steere, Lakota Hotel.
John Weare, 697 Washington boulevard.
O. S. Haas, Hotel Queen.
E. N. Shiner, 370 Wabash avenue.
P. A. Rose, Thirty-ninth street and Ellis avenue.
E. L. Moore, 620 East Division street.
A. Zach, 846 Thirty-second place.
Otto Cromwell, 5955 Morgan street.
A. G. Schmidt, 4527 Drexel boulevard.
F. W. Peck, 1826 Michigan avenue.
D. R. MacMartin, Great Northern Hotel.
R. C. Dickson, 4600 Prairie avenue.
John Farson, 217 Home street.
Alfred Amberg, 411 Monroe street.
Mrs. J. H. Amberg, 411 Monroe street.
B. D. Colby, 560 Jackson boulevard.
J. O. Hobbs, 452 Jackson boulevard.
James Henning, 5139 Calumet avenue.
Fred. Hallin, 220 Lincoln Park boulevard.
Samuel Rowe, 239 Greenwood avenue.
G. D. Beckley, 904 Warren avenue.
A. J. McPherson, Highland Park, Ill.
J. P. Quirk, 1128 Washington boulevard.
W. T. Russell, 1816 West End avenue.
H. E. Thompson, 918 Avers avenue.
Thomas J. Hayman, 315 Western avenue.
Mrs. Henry Schwab, 2453 Indiana avenue, Oak Park, Ill.
E. G. Burgman, 719 Washington boulevard.
William G. Henry, 37 Cedar street.
Jacob Bohlander, Maywood, Ill.
J. C. Roth, Great Northern Hotel.
William Lorimer, Jr., 903 Douglass boulevard.
M. S. Hall, 836 Warren avenue.
George T. Griffin, Virginia Hotel.
Ed. Schildhauer, 2640 Wabash avenue.
David Birkhoff, 408 South Marshfield avenue.
W. L. Williams, 6500 Evans avenue.
J. M. Mansfield, 201 Prairie avenue, South.
A. W. Howard, Aurora, Ill.
R. S. Loesch, 46 Lincoln place.
John Bechtel, Milwaukee, Wis.
George E. Marshall, 6600 Lafayette avenue
H. W. Jones, 4545 Forrestville avenue.
E. C. Kohlsaar, 239 Ashland boulevard.
S. B. Trimble, 5200 Kimbark avenue.
Al. Sagers, 396½ Jackson boulevard.
W. A. Lamson, 3720 Grand boulevard.
C. H. McDowell, 1040 Hinman avenue, Evanston, Ill.
Calvin Fentress, 111 Lincoln Park boulevard.
John W. Garry, 72 Astor street.
Emily L. Garry, 72 Astor street.
Pauline Lyon, 72 Astor street.
B. B. Barker, 364 Burling street.
A. M. Clement, 4009 Lake avenue.
A. E. Nichols, 35 Kendall street.
William H. Hackett, 646 North Clark street.
Charles Nelson, 4830 Drexel boulevard.
Charles W. Elmes, 1502 Hinman avenue.
T. A. Quinlan, 974 North Clark street.
Robert D. Jones, 420 East Chicago avenue.
T. H. Hulbert, 6 East Madison street.
Owen H. Fay, 3305 Calumet avenue.
H. M. Davis, 1410 Michigan avenue.
George F. Cecil, 2317 Michigan avenue.
George L. Sherman, 363 Ashland boulevard.
R. E. Stone, 2035 Prairie avenue.
Paul Pallach, 936 North Hayne avenue.
U. A. Roly, 494 Forty-second place.
Charles H. Moses, Oak Park, Ill.
F. Wolff, 1680 West [illegible] street.

Cal. Garren, 3321 State street.
A. B. Bernhardt, 1336 Belmont avenue.
C. J. Cantrell, 6324 Normal avenue.
William Friedman, 3154 Michigan avenue.
R. B. Holt, 276 Michigan avenue.
Hugo Nelson, 343 Dearborn avenue.
A. Ulrich, 4231 Michigan avenue.
F. Hamilton Clark, 2535 North Hermitage avenue.
S. A. Matthews, 3135 Dearborn avenue.
John W. Keogh, 4401 Ellis avenue.
A. B. Manning, 1456 Newport avenue.
George Heniterson, 1135 Barry avenue.
C. M. Chappell, 259 Bowen avenue.
F. E. Fuegner, 3870 Ellis avenue.
John C. Mohr, 4221 Oakenwald avenue.
S. T. High, 2021 Prairie avenue.
Albert E. Eagles, 1915 Oakdale avenue.
J. R. Stewart, 1979 Sheridan road.
Merton H. Bently, 221 North Scoville avenue, Oak Park, Ill.
Calvin S. Smith, 3982 Lake avenue.
W. G. Pearce, Virginia Hotel.
Max H. Schram, 3358 South Park boulevard.
L. D. Price, 6500 Monroe avenue.
George O. Taylor, 4238 Drexel boulevard.
Fred. B. Woodland, 4058 Grand boulevard.
L. J. O'Brien, 11 East Twentieth street.
C. H. Reil, 135 Lincoln Park boulevard.
J. L. Dykes, 1442 Addison avenue.
Charles Turner, 5140 Michigan avenue.
Charles W. Leeming, 4545 Grand boulevard.
A. C. Banker, 4209 Prairie avenue.
Gresham Goble, 1235½ Thirty-fifth street.
D. G. Emery, Sherman House.
W. B. Hunter, 1303 Michigan avenue.
Julius Rosenwald, 4239 Grand boulevard.
Thomas O. Perry, 1025 Park avenue.
A. J. Lichtenstein, 3936 Michigan avenue.
Bruce Judson, 4231 Michigan avenue.
William C. Karmper, 263 Elm street.
F. R. Sherwood, 1630 Jackson boulevard.
Mrs. S. E. Borrel, 143 Lincoln boulevard.
Mrs. Meta Musgrave, First National Bank Building.
Edward W. Miller, 341 Centre street.
A. W. Tucker, 933 Winthrop avenue.
Charles W. Huck, 194 Thirty-fourth street.
George S. Lewis, 4316 Indiana street.
F. H. Blackman, 4011 Lake avenue.
Charles A. Rusco, Oak Park, Ill.
E. A. Erickson, 1100 West Sixty-third street.
R. Y. Sollett, 4545 Forestville avenue.
William W. Hayes, 5241 Madison avenue.
C. A. Coey, 5311 Cottage Grove avenue.
Joseph M. Wineman, Standard Club.
H. O. Stone, 4924 Woodlawn avenue.
F. Cecil Davis, 3653 Grand boulevard.
Walter J. Jackson, 2228 Dearborn street.
W. H. Hipp, M. D., 5442 Michigan boulevard.
Louis C. Brosseau, 1950 Barry avenue.
C. M. Fair, 2222 Calumet avenue.
A. E. Genius, 4446 Woodlawn avenue.
Frank Barlour, Chicago Beach Hotel.
Ch. H. Hardy, 2712 Dearborn street.
Gus J. Johnson, 4757 Grand boulevard.
Walter H. Chamberlain, 1127 Sherwin avenue.
John E. Stevens, 6815 Emerald avenue.
George Plamondon, 1338 Washington boulevard.
Thomas L. Trecher, 358 Dearborn street.
C. E. Greenman, 3828 Indiana avenue.
E. K. Nelson, 4311 Ellis avenue.
A. J. McDuffee, Great Northern Building.
Mrs. F. A. Pike, 162 Rush street.
A. A. Sprague, 2710 Prairie avenue.
C. B. Pike, 162 Rush street.
David Oliver, Jr., 41 Great Northern Building.
Miss Bertha Biddle, 1922 Calumet avenue.
F. H. Rawson, 4945 Ellis avenue.
Arthur Kehoe, 639 South Ashland avenue.
Robert P. Wheeler, Northwestern Depot.
John B. Long, Virginia Hotel.
J. F. Able, 5200 Indiana avenue.
Ralph Temple, 293 Wabash avenue.
H. Van Vlissengen, 2735 Indiana avenue.
W. E. Parsons, Sherman House.
Wallace F. Clark, 2229 Calumet avenue.
A. Gustavson, 4917 Drexel boulevard.
Edwin H. Clark, 2229 Calumet avenue.
John Wickstrom, 944 Thome avenue.
W. L. Delafontaine, 162 Evanston avenue.
G. Foster Sanford, 3544 Ellis avenue.
A. H. Lloyd, 37 Buena terrace.
Bertrand S. Summers, 1044 Evanston avenue.
S. D. Weary, 5737 Washington avenue.
Heaton Onsley, 408 Erie street.
Ira McCabe, 1776 Fifty-first street.
I. G. Ohmsen, 5402 Indiana avenue.
Edison Kieth, 2110 Prairie avenue.
Chauncey J. Blair, 4830 Drexel boulevard.
A. A. Carpenter, 915 Old Colony Building.
Ralph H. Poole, 89 Lincoln Park boulevard.
Samuel D. Kirschl, 6045 Kimbark avenue.
Samuel Harris, 949 Jackson boulevard.
W. F. Butterman, M. D., 423 Garfield avenue.
W. H. Webb, 3710 Grand boulevard.
J. Y. Milner, 1500 Old Colony Building.
W. H. Mylrea, 23 Thirty-fifth street.
A. M. Barnhart, 185 Monroe street.
Arnold Tompkins, 6640 Parnell avenue.
Mrs. A. M. Barnhart, 185 Monroe street.
Mrs. Wm. N. Pelouze, The Raymond.
L. L. La Zelle, 5331 Greenwood avenue.
F. J. Clark, 1979 Sheridan road.
H. E. Ambler, 5801 Washington avenue.
E. D. Yager, 285 East Fourteenth street.
George S. Eldred, 59 Walton place.
William Sandell, 5903 Normal avenue.

John J. Miller, 5646 Southern boulevard.
C. P. Zacker, 416 West Sixtieth street.
W. C. Jackson, 3603 Ellis avenue.
Louis R. Curtis, 5029 Madison avenue.
John K. Lyon, 72 Astor street.
E. L. Quinn, 4748 Cottage Grove avenue.
Joseph Plummer, 293 Wells street.
J. J. McGrath, 229 Rush street.
Fred. Lane, 900 East Forty-seventh street.
W. J. Wilkins, Lakota Hotel.
J. L. Schuerman, 1308 Humboldt Building.
Robert A. Beek, 1675 Barry avenue.
E. M. Murray, 18 Garden terrace.
John E. Fry, 1400 Michigan avenue.
Ben. S. Boyce, 1850 Wrightwood avenue.
E. E. Eacker, 149 Campbell avenue.
J. C. Brulaker, 1012 East Garfield boulevard.
E. B. Shaw, 385 Ashland boulevard.
E. M. Harrington, Ætna Lake, Ind.
Herbert A. Wright, 1354 Michigan avenue.
Charles Gustavson, 1074 Warren avenue.
E. L. Hill, 399 Dearborn avenue.
Otto C. Brundage, 5822 Wentworth avenue.
George A. Allen, Western Springs, Ill.
John F. Nichols, 6610 Harvard avenue.
Charles E. Gregory, 4215 Langley avenue.
E. A. Laughlin, Auditorium Annex.
J. W. White, 2813 Princeton avenue.
H. N. Goodsmith, 959 North Clark street.
D. C. Wright, 3812 Vincennes avenue.
John H. Means, 205 Caso street.
Charles H. Wilcox, 40 Dearborn street.
A. D. Plamondon, 3543 Michigan avenue.
James Killhoff, 173 Bunker street.
Arthur M. Brienza, 1233 Jackson boulevard.
E. S. Skilter, Chicago Beach Hotel.
A. H. Breckenridge, 627 Sheffield avenue.
W. T. Hoops, 4112 Drexel boulevard.
John H. Drew, M. D., 23 Astor street.
Thomas Flower, 200 Rialto Building.
Walter C. Scitter, 3603 Lake avenue.
W. B. Judson, 4231 Michigan avenue.
C. Dyer, Hotel Del Prado.
William L. Hiblord, 1354 Michigan avenue.
J. H. Weir, 200 Rialto Building.
George H. Dunkl, 1279 Wilcox avenue.
Thomas Madigan, 846 Paulina street.
C. H. Tucker, 933 Winthrop avenue.
Ernest Fries, 2521 Prairie avenue.
C. W. Prorsent, 1326 North Clark street.
O. H. Brumback, 109 Loomis street.
Frank Spaulding, 4433 State street.
O. J. White, 5247 Lexington avenue.
James A. Charter, 167 Franklin street.
Miss Edith Charter, 167 Franklin street.
J. Couch, Calumet Club.
William Johanson, 719 West Nineteenth street.
A. Walentenowicz, 3319 South Morgan street.
F. Joliceur, 60 Egan avenue.
H. A. Lange, 461 Northwestern avenue.
Chauncey B. Blair, 4830 Drexel boulevard.
C. W. Duer, 5553 Cottage Grove avenue.
Charles J. Hanzlek, 1347 West Twenty-first street.
A. W. Haskell, 521 Washington boulevard.
H. P. Rushing, Racine, Wis.
E. J. Church, 1572 Fulton street.
Jos. C. Otis, 2832 Prairie avenue.
Marshall J. Wender, 590 Fulton street.
Miss E. Schlesinger, 2805 Michigan avenue.
Carl Heninzen, 4337 Drexel boulevard.
M. Renshaw, 4421 Ellis avenue.
Edward Anderson, 658 West Superior street.
C. W. Forester, Chicago Beach Hotel.
E. P. Miller, 1572 Fulton street.
G. S. Chapin, 219 Marshfield avenue.
B. F. Schlesinger, Wilmette, Ill.
W. M. Stewart, Geneseo, Ill.
F. W. Gilson, 5619 Madison avenue.
Charles M. Peterson, 976 Ballou street.
R. M. Genius, 4446 Woodlawn avenue.
D. W. Gould, 4860 Prairie avenue.
John H. Lodgeman, 2350 Clarendon avenue.
J. H. Robinson, 3150 Armour avenue.
K. G. Godfrey, 12,133 Eggleston avenue.
William Allen Pusey, Evanston, Ill.
George W. Merrick, 5937 Ohio street.
W. G. Lloyd, 117 Wallen avenue.
C. Morrish, 4401 South Halsted street.
Daniel Young, 929 Madison street.
C. D. Cutting, 923 Jackson boulevard.
O. B. English, Chicago Beach Hotel.
Burr Robbins, 2354 Claremont avenue.
R. A. Waller, 1485 Sheridan road.
Jacob Spangler, 96 Siegel street.
Henry Goodman, 107 Thirty-seventh street.
F. R. Shepherd, 115 Buena terrace.
G. W. Dennison, 385 Superior street.
M. M. Markwell, 684 Forty-eighth street.
W. D. Morris, 1930 Damming place.
H. A. Hubbard, 3306 Fridong avenue.
Joseph G. Hodhes, 6432 Washington avenue.
W. L. Rose, 7729 Lowe avenue.
Mrs. H. D. Sturtevant, 150 Pine street.
O. E. Babcock, 147 Lincoln Park boulevard.
R. H. Croninger, 290 Winthrop avenue.
Prince N. Engalitcheff, 487 Dearborn avenue.
A. L. Kuehmsted, 4909 Madison avenue.
Fred. Tooker, 4800 Kimbark avenue.
E. L. Frankenthal, 4800 Kimbark avenue.
A. T. Schmidt, 106 Hammond street.
R. T. Crane, Jr., 2541 Michigan avenue.
E. F. Bosley, 538 Washington boulevard.
A. D. Shanks, 1400 Michigan avenue.
R. B. Fost, Lacon, Ill.
W. D. Hall, Oak Park, Ill.
Edward Armhold, 1117 Wrightwood avenue.
Harry B. Collins, 2006 Indiana avenue.
Frank A. Hardy, 2221 Wabash avenue.

Harry A. Dice, 207 Twenty-eighth place.
George W. Webster, 1441 Castelwood avenue.
William Walsh, 716 Sedgwick street.
Nels Anderson, Oak Park, Ill.
C. Stegmund, 4626 Cottage Grove avenue.
Fred. L. Glenn, 87 North Forty-eighth avenue.
P. L. Hardin, Lexington Hotel.
Miss M. A. Hardin, Lexington Hotel.
J. F. Gunther, 738 Cullom avenue.
John L. Morris, 4512 Drexel boulevard.
Henry Conkey, 5518 East End avenue.
Allan Blanchard, 975 Adams street.
J. H. Whipple, 680 Monroe street.
J. H. Phillips, 5400 Kimbark avenue.
G. G. Burdick, 2979 South Park avenue.
W. A. Crowdus, 5325 Cornell avenue.
C. J. Frech, 919 Belmont avenue.
W. M. Thompson, Evanston, Ill.
Charles H. Jones, 1093 East Forty-seventh street.
George E. Cook, Elgin, Ill.
L. E. Dimmick, 88 Twenty-third street.
F. C. McDonald, Virginia Hotel.
John B. Conrad, 3206 Rhodes avenue.
B. E. Taylor, 1611 Fulton street.
A. L. Utz, 192 Michigan avenue.
Frank Cary, M. D., 2935 Indiana avenue.
Mrs. W. F. Newman, 3441 Michigan avenue.
John W. Bate, 551 La Salle avenue.
A. B. Porter, Evanston, Ill.
J. B. Burdett, 7746 Peoria street.
F. M. Brinckerhoff, 149 Ashland boulevard.
W. Counselmann, 383 East Superior street.
Otto Unzicker, 1824 Melrose street.
William F. Becker, 928 Jackson boulevard.
C. D. Brock, 4612 Langley avenue.
C. A. Sandberg, 463 Dearborn avenue.

From Indianapolis to Magnolia.

One of the members of the North Shore automobile contingent, F. M. Ayers, of Indianapolis, last year had the idea of making his trip to the East in his automobile. At the time he was using a Winton phaeton. He made the trial then, but by the time he had reached Albany he had weakened his car somewhat, and a breakdown there on a Saturday night led him to give up the attempt at that time and continue to the North Shore by train. The failure rankled a bit, however, and this year, having provided himself with a touring car of the same make, he determined that nothing except a serious mishap should debar him from running through from start to finish over the road. He carried out his intention. It was not all fun, for he had to encounter a good deal of rainy weather and some terribly muddy roads; but he reached his goal and has a fund of experience to draw on when people want to talk automobiles with him.

Mr. Ayers' car is a 15 horse power touring vehicle with tonneau. With Arthur Smith, of Indianapolis, and Page Chapman, of New York, in the tonneau seats the owner started from Indianapolis on the morning of Tuesday, August 5, heading for Dayton. They traveled in the rain for the first day 110 miles; made 142 miles the second day, and at the end of the third day, with a final scurry of 50 miles through sand and rain, they came into Cleveland, having made their way straight up through the State of Ohio, by way of Marion and Columbus, over roads that were for the most part among the best found anywhere on the trip. From Cleveland the route was through Erie, Pa.; Buffalo, Rochester, Syracuse and Albany, N. Y.; then through the Berkshire Hills by way of Pittsfield and Dalton, then through Warren, Springfield, Worcester, to the Boston district. The route was not laid through the city, however, for in order to keep to the good roads and avoid pavement, Mr. Ayers left the boulevard road at Newton, and ran around by way of Waltham and Arlington to Malden, thence to Lynn, Salem, to his North Shore destination. The homestretch, from Worcester to Magnolia, was made between 12:30 and 6 p. m. on Saturday, August 16, easy going, to be sure, for the trip was not in any sense an attempt to make a record run. The entire journey, actual running time, occupied nine days and a half.

No accident interfered with the trip this year. There were a few minor breaks and the machine wore out three tire cases on the run, but these things were provided for and caused only temporary delays. There was no travel by night except when dusk found the travelers within 10 or 20 miles of some large city; then they kept on rather than put up over night in a small town.

Mr. Ayers learned some interesting things about the roads while making this trip. With rain almost every day the highways were unusually soft and slippery, and he had an opportunity of comparing the relative excellence of road building in the four States he traversed. He says the poorest roads were in New York.

In a low lying section betwen Rochester and Syracuse the roads were in some places 2 or 3 inches under water, and the tourists were forced to make a circuit of 30 or 40 miles in order to find highways suitable for their passage. This was no worse than an experience they had near Amsterdam, N. Y. There they met two Boston men who had been touring westward in an automobile when they struck a stretch of about 100 feet of roadway which, for the machine, was a veritable slough. Their vehicle got stuck there and made them so much trouble that they were forced to abandon their trip. The warning they were enabled to give the party bound eastward came in time to allow Mr. Ayers some idea of what he must encounter. With a machine weighing 1,950 pounds it wouldn't have been easy to get out of a bog if once the edge had been reached. When the Winton approached the slough Mr. Ayers and his friends procured heavy planks and with them had a temporary track constructed, and on this they got their big machine safely over the soft mud without anything worse than a delay. Yet with this as a sample of New York roads, their opinion of them is not high. Except for about 30 miles of highway near Rochester, they had no State highways at all in New York.

In Massachusetts they found good roads practically through the entire distance. They found the 4 mile grade over the famous long hill near Pittsfield a stiff little climb, but the machine negotiated it without balking; and in the hilly section of Ohio, too, the machine proved itself a good climber. The best roads of the entire run, excepting the State roads, were those found in Ohio, between Indianapolis and Columbus.

One of the difficulties of this trip was to get along amicably with nervous horses and their farmer drivers in the country districts; but Mr. Ayers thinks himself lucky to have come through without having caused a single runaway or having been responsible for any accidents to other users of the roads. Since he has been at Magnolia he has used his big car for short trips all around the district.—*Boston Transcript.*

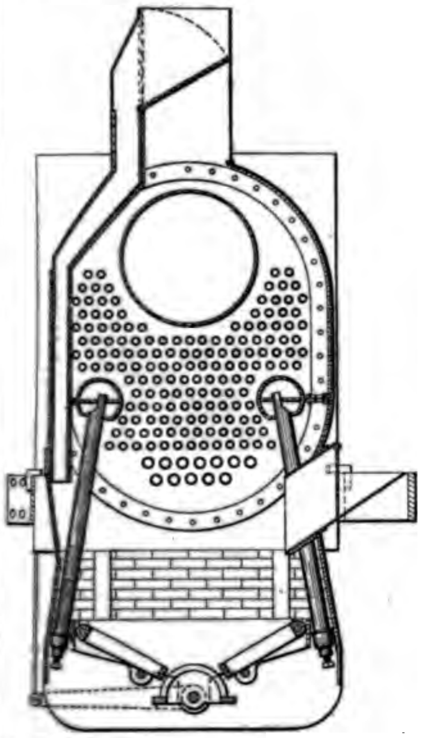
GASOLINE TONNEAU OF A. L. DYKE, ST. LOUIS.
Made From His No. 1 Outfit. Single Cylinder Horizontal Engine 5¼x6 Inches.

MOTOR VEHICLE PATENTS..

United States Patents.

707,996. Steam Generator.—Paul H. White, of Indianapolis, Ind. August 26, 1902. Filed September 7, 1901.

The generator has been especially designed for use in connection with motor wagons and comprises a water tube boiler



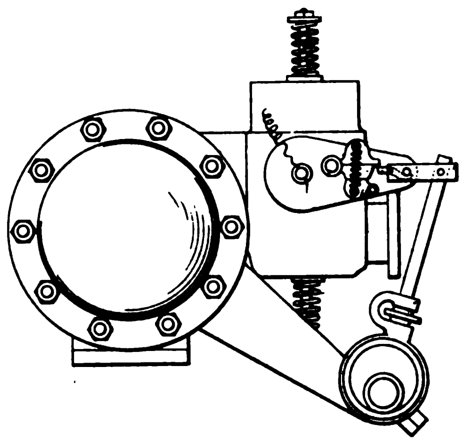
below which is arranged a grate for the combustion of solid fuel.

Leading from the combustion chamber is a supplemental flue or outlet which leads from a point below the main body of the generator upward to the main flue, said supplemental flue being lined, both inside and out, with sheet asbestos. At the point where the supplemental flue joins the main flue is mounted a damper, which may be thrown so as to close either of the two flues. When the damper is thrown so as to close the supplemental flue all of the heat from the furnace passes upward between the water tubes or through the body of the generator and out through the main flue. If the damper be thrown so as to close the main flue, however, a sufficient draught is maintained through the supplemental flue to maintain a fire; but at the same time the circulation of heat through the body of the generator is prevented, sufficient heat bein[illegible]s, maintained about the body [illegible]rator to maintain or practically [illegible] the steam pressure. The supplem[illegible]ue makes it possible to maintain the fuel in good burning condition without an excess of heat in the generator, so that when the consumption of steam is again resumed the fire is in proper condition to produce an adequate supply of steam.

708,042. Sparking Igniter for Explosive Engines.—John B. Hicks, of Detroit, Mich. September 2, 1902. Filed November 9, 1901.

In the explosion chamber are arranged two contact points of platinum. One of these points is fixed to a metallic rod which passes through the wall of the explosion chamber and is insulated therefrom. The other point is fixed to an arm which is secured to a rock shaft. This rock shaft is mounted in and extends out through the wall of the explosion chamber.

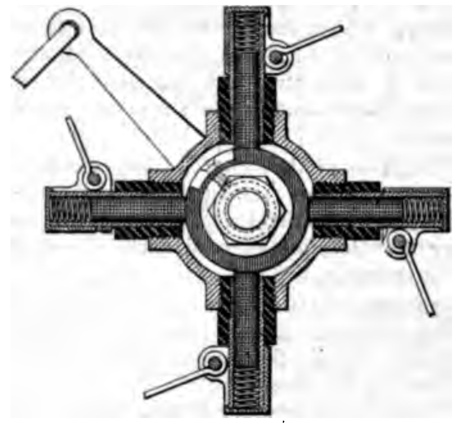
It is desirable that the movable electrode shall not be obliged to move far when its movement is toward the other electrode, and it is likewise desirable that when the electrodes separate the separation shall be rapid and far. To produce these results is the object of the following construction: An arm is secured to the rock shaft out-



side of the explosion chamber, another arm is loosely mounted on said rock shaft above the first mentioned arm, and a third arm is pivoted to a fixed support and lies below the first mentioned arm. A coiled spring is connected with the two outer arms and draws them toward each other and against the intermediate arm. The surfaces of these three arms, which under normal conditions are in contact with each other, are flat, and the outer end of the upper arm normally rests upon the end of a trip finger pivoted to a lever. This lever is operated periodically by a connecting rod, to the upper end of which it is pivoted, the lower end of this rod being connected with an eccentric strap, which embraces an eccentric on the cam shaft. A nut which screws onto the connecting rod and lies between two arms on the eccentric strap is the means shown for connecting said rod with the eccentric strap, and this connection permits an adjustment of the length of the rod for the purpose of exactly timing the making of the ignition spark.

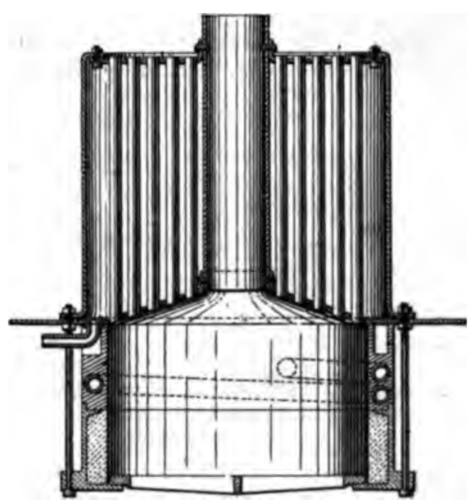
708,053. Apparatus for Distributing the Primary Current for Electric Ignition by Coils and Igniters in Explosive Engines.—A. C. Krebs, of Paris, France.

The apparatus comprises a cylindrical body fitted with moderate friction on the half speed shaft, which has to distribute the current to each cylinder in succession during its revolution. The distributing cylinder of insulating material is fixed on the shaft and has a metal segment connected to the shaft by a screw. The metal body



has as many projecting bosses as there are cylinders of the engine, on which bosses are fixed brush holders, each consisting of an insulating cylinder screwed into the boss of a metal tube, passing through the cylinder of a cylindrical brush, consisting of a roll of fine wire gauze, a helical spring pressing on the brush, and a cap split on one side and clamped by a screw, which at the same time fixes the conducting wire. The apparatus operates as follows: The shaft as it revolves brings the metal segment piece to each of the brushes in succession, thus connecting the shaft to the conductor leading from that brush to the coil. The position of the body upon the shaft can be varied by means of a handle and lever, the period of ignition in the cylinders being thus regulated by adjusting the points of the revolution where the primary current is transmitted. The front of the body is covered by a cap as a protection of the brushes and cylinder from mud, rain, dust, etc. The brushes can be easily dismounted, and when they are worn fresh brushes can be readily substituted. The springs are such as to cause practically constant pressure of the brushes, however much they are worn.

708,066. Steam Generator.—W. Norris and H. Spurrier, of Blackpool and St.



Annes-on-the-Sea, England, respectively. September 2, 1902. Filed February 25, 1902.

A fire tube boiler for motor trucks, the specific improvement residing in the construction of the fire box crown plates with angles which project beyond the boiler shell and afford means whereby the boiler may be supported, and so, also, that it forms the bottom of the steam and water space.

In place of the water pocket, which is cast in the iron ring surrounding the upper part of the fire space, external recesses for the reception of mud cock elbows is cast therein.

708,225. Elastic Tire and Process of Manufacturing Same.—Frank E. Hall, of Quincy, Mass. September 2, 1902. Filed February 23, 1900.

A tire manufacturing process which consists, first, in semi-vulcanizing the tire in a mold to give it its cross section shape; second, in coiling said tire with a circumference less than its circumference when applied to the wheel to expand the outer periphery; and, third, in fully vulcanizing said tire in its coiled position, so that when applied to the wheel the outer periphery will compress.

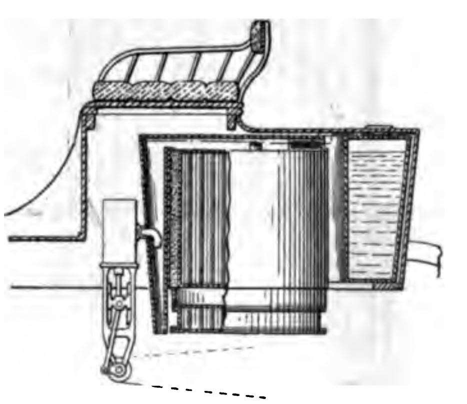
708,231. Vehicle.—Charles W. Hunt, of West New Brighton, New York. September 2, 1902. Filed June 14, 1902.

A vehicle comprising a middle and a rear truck, cross connections between said trucks, a body mounted on said trucks, a forward steering truck, a rigid frame or reach connecting said steering truck with the middle truck, and an independent body mounted on the steering truck and reach.

708,356. Combined Driving Gear and Brake for Motor Vehicles.—H. H. Hennegin, of St. Louis. September 2, 1902. Filed April 8, 1901.

The apparatus covered by the patent consists of a friction wheel drive, the driving pulley of which is mounted on a rocking shaft. When the shaft is moved in one direction the pulley is brought to bear against the wheel and thus causes the vehicle to start, while, if moved in the opposite direction, the pulley is brought to bear against a stationary brake shoe.

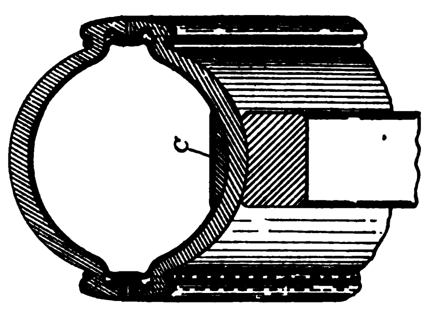
708,460. Flue Construction for Steam Carriages.—James H. Bullard, of Springfield, Mass. September 2, 1902. Filed November 8, 1900.



The upper end of the boiler is inclosed by a hood for receiving the products of combustion from the boiler, this hood forming a flue having substantially horizontal divergent branches, which are provided with outlets to the atmosphere and are arranged on either side and to the rear of the centre of the boiler, the branches together forming a through passage for disposing of atmospheric currents, which might otherwise reverse or check the normal draft of the burner. From the part of the hood in front of the boiler a flue extends downwardly and an exhaust pipe from the engine enters this flue. By placing this flue in front of the boiler the latter receives the benefit of whatever heat may be contained in the products of combustion or exhaust steam passing therethrough.

By means of this construction it is seen that the outlet ends of the two lateral flue branches will be protected against the blanketing effect of a following wind, and any draft of air due to a cross wind which might enter one of these flue branches would pass therethrough and find exit through the opposite branch thereof without interfering with the natural updraft through the burner and boiler. The disposition of the down draft flue at the front of the boiler effects the discharge of the exhaust at a point well under the vehicle, whereby it may become practically dissipated before it is clear from the body of the vehicle. Furthermore, a part of the exhaust steam will be drawn in through the burner, and thus dissipated without detriment to the combustion of the fuel.

708,482. Pneumatic Tire.—Thomas B.



Jeffery, of Kenosha, Wis. September 2, 1902. Filed July 24, 1901.

The purpose of this invention is to provide a pneumatic tire for vehicle wheels which shall to a greater extent than any hitherto in use be free from the liability to deterioration by what may be called "internal wear" or the tendency of the alternate contraction and expansion, bending and flattening to break down the structure of the fabric.

The tire consists of two concentric flexible bands. One of the bands is seated at the middle part of its width on the periphery of the rim and secured thereto in any desirable manner. The most convenient and secure method of fastening it is to employ an outer strap or band, which may be a continuous or closed ring of suitable diameter to be forced tig the position shown, encompassing ner element of the tire and fitting enough when thus forced on to h tire stretched.

The two elements of the tire r made of textile fabric and rubber a customary mode of constructing ou ings of pneumatic tires now in use. are joined together at their latera by circular metal channels as showr

707,538. Rim and Felly for Rubl hicle Tires.—John Baker, Meacha August 26, 1902. Filed April 9, 19c

707,650. Anti-Frictional Bearing.- eric S. Seagrave and Homer P. Columbus, Ohio. August 26, 1902. November 22, 1899.

707,695. Motor Vehicle.—Josej Hoadley, New York, N. Y. Augt 1902. Filed December 27, 1900.

707,793. Gasoline Engine.—Eddy ' Kaig, Chicago, Ill. August 26, 1902. August 26, 1901.

707,794. Lubricating Apparatus f gine.—Eddy T. McKaig, Chicag August 26, 1902. Filed December 9

707,939. Armor for Vehicle T Charles H. Paschke, Buffalo,] August 26, 1902. Filed February 26

707,984. Driving Mechanism for Vehicles.—William S. Taylor, Jr., of Ohio. August 26, 1902. Filed No 20, 1901.

708,080. Revolving Electric Ig Anson G. Ronan, Toronto, Canada. tember 2, 1902. Filed June 5, 1901.

708,439. Speed Regulator.—He White, Kalamazoo, Mich. Septem 1902. Filed June 9, 1902.

708,475. Roller Bearing.—Albe Henderson, Toronto, Canada. Sept 2, 1902. Filed April 10, 1902.

Australian Patents.

(From Phillips, Ormonde & Co., 533 street, Melbourne, Victoria.)

Apparatus for Locking the Wheel Vehicle.—A. Cooper, of Adelaide Wellington, New Zealand. No. In the State of Victoria.

Device for Oiling Axles of Vehi T. S. Philpott, of Mein street, Nev New Zealand. No. 12,030. In the of New South Wales.

Gearing for Velocipedes and Roa tor Vehicles.—J. Archer, of 17 Li street, Hulme, Manchester, Englan 12,049. In the State of New South

Improvements Relating to Pne Tires.—J. R. Brunt and R. C. Pitt, of 145 Litchfield street, Christchurch Zealand. No. 19,133. In the Sta Victoria.

Improvements Relating to Wheel Tires for Vehicles.—G. W. Pitt, of Molton Mansions, and E. Martin, Park Lane, Stoke Newington, bo London, England. No. 11,834. I State of New South Wales.

THE HORSELESS AGE

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Cost of Operation.

Statements from users of how much it has cost them per mile to operate their machines, which we have lately published, fail to harmonize with each other. In our issue of August 27 a correspondent stated that the cost of operating his gasoline carriage so far had amounted to only 1½ cents per mile, while in the present issue a user of long standing figures his cost per mile to be about 21 cents. There is an enormous difference here, pointing to large differences either in the machines, the operators or—the point from which the matter is looked at. It is worth while, therefore, to analyze the figures given in the article on "The Item of Cost" in the present issue.

One of the chief factors in the cost account is the depreciation of the machine—$950 in twenty-six months, which constitutes more than one-third of the total expense. Now in this respect things will certainly be much more favorable in the future. Up to now automobiles have been pretty much out of date after two years of service, owing to actual, important progress in construction; and, although a limit to improvement will never be reached, progress is bound to be slower in the future, and the models of successive years will differ less from each other, both in appearance and in actual worth. As a result depreciation will be less rapid.

Now as to the item representing the cost of the auto barn, about which something is not entirely clear. It is to be supposed that the barn had a longer life than twenty-six months, that it is still doing service, or is capable of doing service at least. It is not stated that this barn was included in the sale of the vehicle for $250; if it was not an allowance should certainly be made for its present value, which should be at least 75 per cent. of the original cost. That the writer of the article failed to make this allowance would suggest that he is not particularly anxious to show the automobile in the most favorable light.

The repair bills have been rather high, which may be accounted for as follows: In a physician's driving it is, of course, impossible to always pick out good streets; the vehicle has to go on every kind of pavement, cobble stone as well as asphalt, and more repairs may be expected than in a strictly pleasure vehicle. The vehicle was of an early type, no longer manufactured, in which some parts liable to require repairs or renewal were very inaccessible. Finally, the repair men seem to have charged unreasonably high prices.

Perhaps nothing can be said against including in the statement of expenses interest on the money invested, as this actually constitutes a part of the total cost of keeping and using an automobile. It is to be observed, however, that those who report a very low cost per mile never figure on this item, and here, in consequence, we have another factor accounting for the great variation in cost per mile reported by different users.

In conclusion it may be stated that, in our opinion, the summary of expenses in the article referred to includes some items which are rather overestimated, the barn, for instance, and the repair charges, some repairs having been made on another vehicle. If this still leaves the cost comparatively high it is due chiefly to the difficulty of repairs to and the rapid depreciation of the earlier types of vehicles.

If we take an average of the figures furnished by different users—say, 10 cents per mile—we believe we have a standard of economy which may easily be attained by any careful user with a modern well made machine of the runabout or medium weight type. It is, of course, obvious that the higher the speed at which a machine is run the greater will be the expense per mile, this relation holding in all other departments of transportation on land and water. Of course, we do not mean to say that 10 cents per mile is the minimum cost per mile (including everything) that is obtainable at present, but regard it as a figure which fairly represents present possibilities under average conditions. On the other hand, the 21 cents per mile, high though it may seem to some, is of course very much less than what a machine of the class popularly known as "Ghosts" and "Devils" can be run for. But, then, to the classes who use this sort of machine the factor of cost is usually of little importance.

The Endurance Contest.

As is shown by the list published in this issue, the entries for the Automobile Club's reliability trial, to begin three weeks after to-morrow, already include nearly all the well known American makes. There is no doubt that the number of entries will fall considerably short of the original estimate as given to the daily press, owing, perhaps, largely to the fact that the rules are not very favorable to the lighter, low powered machines; but any manufacturer of touring cars can hardly afford to neglect this opportunity of demonstrating his vehicles to the public under proper auspices, and since as many as five machines of the same manufacture have already been entered in one or two cases, we expect to see the number of entries attain the mark set last year.

It would be advisable for prospective entrants to enter at the earliest possible date; not that there is any particular advantage in having a small entry number, as in long distance road races, but because the organizers can better make the arrangements if they know at an early date the approximate number of contestants. The increase in the entry fees on September 10 was intended, of course, to insure early entering of vehicles, but the amount of the increase was hardly large enough to have much influence on the hesitating.

It has meanwhile been authoritatively denied that Edison will enter a vehicle equipped with his storage battery, and as other electric vehicles have not yet been entered it seems that the contest will again be confined to steam and gasoline vehicles, which might, however, have been expected since such a test as this is not at all suited to the demonstration of relative merit between electric vehicles.

The speed rules must be regarded as somewhat peculiar and not entirely satisfactory. On the maps for the various sections are stated the minimum and the maximum times which contestants may occupy in any particular section. To secure the full number of marks for reliability they must arrive at the control exactly in minimum time, a feat which will call for considerable judgment on the part of the drivers (as well as qualities of speed and endurance in the machines). It is to be assumed that no disqualification will result in case of slight excesses over the average speed required for minimum time, as otherwise the task set the operators—to drive over a long distance at an exact average speed of 15 miles an hour, and no more, on penalty of disqualification—would be a rather difficult one. At any rate, there will again be considerable temptation to race, and the race committee will have to be both vigilant and determined to prevent occasion for police interference, which would be deplorable in every respect.

A Case of Hardship Under Village Auto Law.

The recent arrest for excessive speeding of a law abiding citizen of Paterson, N. J., who was on his way in his automobile from his home to the seashore and unintentionally violated one of the myriad village ordinances which harass the New Jersey tourist, again calls attention to the absurdity of the present state of automobile legislation. The gentleman in question bears the reputation of a careful operator and in this case had no thought of violating any law, but there were no signs posted to warn automobilists how far the 8 mile limit extended, and supposing from appearances that he had reached the country or thinly settled district where higher speed is allowed, he quickened his pace only to fall into the hands of the law. The town police knew where the village ended, if nobody else did. The luckless offender was fined (under protest), although the fault lay plainly with the village authorities who had failed to notify the public of the bounds of their jurisdiction.

The intolerable nuisance of the whole system of multiform legislation now in force is becoming daily more apparent. A uniform law for each State at least should be the slogan of the automobile fraternity from this time forth.

The Foreign Press on Speed.

In our last issue we quoted a number of views from European automobile journals on the speed question. It is perhaps not surprising that in Europe, more than here, the greater part of the automobile press should favor racing and acquiesce in speed excesses, especially in France, since racing has received unmeasured encouragement there, and the direction of progress has been almost exclusively determined by the sporting proclivities of the devotees of the automobile. "What is to become of the industry?" indignantly asks a French contemporary after announcing that severe measures are to be taken in France to suppress excessive speeding, entirely forgetting that an industry can never lastingly prosper if its success depends upon license, lawlessness or legislation i to the community in general. Th reply to the above question is that cess of the industry is to be sougl the lines of application to the prac quirements of life and to legitimat ure purposes instead of in the deve of a taste for reckless speed—auto and the insurance of police acqu in the indulgence thereof.

We take occasion here to cong our French contemporary, *La Lo* upon the stand it has taken in thi from the beginning, appreciating t particularly difficult to maintain t tude it has observed in France, wl racing mania has gained such That journal has persistently—an among the automobile publication country, as far as we know—poin the error of forcing the sale and n ture of purely racing machines, an seled the abandonment of races adoption of a more rational cours velopment.

In its latest issue to hand, in a on "Our Cancer," by which the monster is referred to, the editor as follows on the folly of running n at the speeds which have been att recent races:

"There is therefore no need of i ing that I am no fervent admire 120, 125 and even 136 (kilometre) p to which we have now attained. these speeds, for three principal re

"The first is that 100 per hour take this figure as a generalizatic commonplace performance, and co no exceptional mechanical difficult

"In the Paris-Vienna race the thirty vehicles which were capable speed. All the leading French n turers would attain such speeds were willing to sufficiently negle regular routine work and provide essary special factory facilities. many Mercedes has been able to lish it and in England Napier ha machines fast enough to wrest fron Gordon Bennett cup.

"Well, eighteen months ago dreamt of such speeds. Today t within the attainments of all; t commonplace. And as it is difficul mit that all our works comprise genius, it must be concluded that hour is easily made. What, then, remarkable about it? Does it req rare gifts bestowed by nature upo individuals to drive in a race or

banked track at Deanville a specially fast machine? Then we would have to idealize the accomplishments of our great jockeys! Let us rather take a glance at the list of records made during the last five years: Every year brings us a new and larger crop of wonderful racing experts; and the more the difficulties seem to grow with the increase in speed the more the number of fast drivers itself increases, in all classes and in all parts of the world, from the 'millionaire' Vanderbilt and the Count Zborowsky to the former coachman Peter and the former groom Paul. All possess the genius of the wheel. In the Paris-Vienna race there was not one great man only; there were a hundred great men, each capable of 100 per hour!

"Consequently it is in reality a vulgar prowess and an ordinary accomplishment to drive an extra fast vehicle in a race. As many good drivers are born every year as racing vehicles are constructed. Hence, what is there admirable in it?"

Dangerous Road Passages.

In our last issue we printed a photograph of the scene of the recent fatal accident at Elberon, N. J., for which photograph we are indebted to a correspondent. While the accident was undoubtedly primarily due to the recklessness of the driver in running his machine at too high a speed, considering the locality, it appears from the photo. and also from the description of the bridge and its fence protection which accompanied the original report of the accident, that the bridge over the viaduct is inherently dangerous. The bridge is protected only by a frail single board fence on either side. which, except perhaps as regards pedestrians, might just as well be absent altogether. What would happen, for instance, if a horse should slip and fall against the railing? Wouldn't he be certain to go down to the tracks with results equally as serious as those of the automobile accident? Instead of the frail board fence this bridge and all similar ones should have substantial iron railings, which would withstand any ordinary onslaught. With the growing popularity of touring, more attention must be paid to the general safety of roads and bridges. When one travels over thoroughly familiar roads in the vicinity of his home he may always take the necessary precautions where the conditions demand it, but in touring on unfamiliar roads it is different. In France the Touring Club makes it one of its duties to mark by signs any dangerous passages in the road, or to use its influence to remove the cause of danger if this can be done. We have in this country a number of road organizations, and it would be well if one of them should make it a special object to insure the safety of roads and bridges.

Wood Wheel Standardization.

According to a recent announcement the National Association of Automobile Manufacturers will shortly consider the standardization of rims for rubber tires, as to profile and number of lugs. It occurs to us that the association might at the same time go one step further and see what can be done with regard to the standardization of wood wheels.

There is hardly an automobile concern in the country that builds its own wood wheels; a majority of all wood wheels for automobiles are built, or rather "filled," by a few large wheel building concerns. At present all such work is done to order, as there is absolutely no uniformity between the requirements of the different manufacturers. If standards were adopted and recommended by the N. A. A. M., the wheel building concerns referred to would begin the construction of wheels for automobiles on a manufacturing basis, which would result in a considerable reduction of cost on the one hand and greater convenience to users on the other. It is, of course, a rarity in ordinary work that a wood wheel gives way, but occasionally such wheels are broken by running against the curb, in collision, etc. With standard wheels it would in such a case be a much easier matter to replace the broken one.

As regards diameters, it would appear that three sizes would satisfy all requirements at present. Twenty-eight inches has become a very common size for wire wheels, and a wood wheel of this size would be required to interchange with wire wheels. Few automobile wheels are over 36 inches in diameter, so 28, 32 and 36 inches would probably be found the most suitable sizes.

The most complicated problem in this connection is, of course, that of standard hubs. When the wheel is keyed to the axle, as is most frequently the case with driving wheels, a standard bore, standard keyway dimensions and projection of the hub to either side of the wheel centre might be agreed upon, but in the case of free running wheels, such as all front wheels are, the difficulties to be met are considerable. Some manufacturers use plain bushed bearings and other ball and roller bearings. The best form of hub, that is, the one with the least waste material, is different for each of these three kinds of bearings, but some sacrifice in the matter of weight might well be made to secure the advantages of standard parts. It is quite logical that standardization in automobile construction should begin in such parts as tires, rims and wheels, as there are no such radical changes to be expected in these parts as in the power equipment, and as standardization in these parts is less hampered by patent complications than in the truly mechanical parts.

Adjustable Bearings.

There are a few points set forth in the article by Mr. Clough on the above subject with which we cannot agree. In one sense it would be desirable that all bearings were made adjustable, but it is very much open to question whether the means at present available for making bearings adjustable justify their adoption in many parts of automobile mechanism. It is a very simple problem to make crank shaft bearings adjustable on open engines, but we confess that we know of no simple and practical method of making adjustable bearings in oil tight crank chambers. It would hardly be practicable in case the crank chamber was divided on the crank shaft centre line to put a packing in the joint, which could be replaced with a thinner one when the bearing should require taking up, nor do sliding joints appeal to us for an oil tight chamber.

Various methods of adjustment may suggest themselves, but all that we can think of are open to the objection either of being too complicated or of affecting the oil tightness of the chamber.

We believe, then, that a liberally designed bearing, together with an arrangement of the engine permitting of an easy removal of the bushes, will prove a more acceptable preventive for worn and knocking bearings in oil tight cases than means for adjustment.

With regard to the connecting rod bearings conditions are different, of course. The bearing at the crank end should be, and generally is, provided with means for taking up wear.

While play in these bearings is, of course, objectionable, it develops less easily than in other bearings, because the

pressure during compression and expansion is always in the same direction. The wrist pin bearing is generally not made adjustable in automobile engines. As a rule this bearing can be made of liberal dimensions, and as there is very little motion at its bearing surface its wear ought to be small. A method of adjustment sometimes adopted consists in splitting the bearing on one side and passing a cap screw through lugs on that side, the screw being secured by a lock nut. Some slight adjustment can, of course, be made by these means, but the adjusting device is not very readily gotten at, and this, together with the possibility of the adjusting screw rattling loose, makes its advantages seem very doubtful.

Adjustable Bearings a Requisite of the Practical Automobile.

By Albert L. Clough.

Every mechanical construction which is to be subject to wear among its parts, and which is expected to have an extended career of usefulness, must necessarily be provided by its builders with means for correcting this wear and of restoring the machine to its pristine condition of correct adjustment. There are plenty of cheap mechanical contrivances turned out in enormous quantities at low prices, the parts of which are not provided with adjustments, and these are bought with the implicit understanding that they will have to go to "scrap" after excessive wear is manifested. Costly mechanisms, however, which contain a large number of expensive parts not subject to much wear, and constructions in which the cost of assembling represents a considerable fraction of the total, are seldom built by reputable concerns without a careful provision for a restoration to proper working condition of the parts subjected to wear. This class of constructions cannot economically be "scrapped" on account of the large investment in non-wearing parts, and hence must be repaired. If they can be repaired only by the replacement of the worn part, a repetition of a large fraction of the assembly cost would be involved in the process of taking apart and putting together, and so to avoid this adjustments must be provided. The extra labor required to render wearing parts adjustable is generally found to be practically negligible in respect to the total labor which such provision will save during the life of the mechanism.

An expensive mechanical construction which is not completely provided with adjustments for taking up wear is either doomed prematurely to the scrap heap or else fated to prove a veritable bonanza to the repair man. Unfortunately, there are many automobiles to which this statement is applicable. Whether this condition amounts to a frank admission upon the part of their manufacturers that the machines will be valueless through changes in the art or other causes, before they show excessive wear, is a matter for conjecture, but it is evident that the future usefulness of such a machine cannot be regarded very seriously by its builder, unless the ordinary, well known means for adjustment are provided.

EXCESSIVE WEAR IN THE EXPLOSION MOTOR.

The explosion motor, perhaps more than any other mechanism, owing to its peculiar and enormous torque variations, produces excessive stresses upon all its bearings. The wear of these bearings is consequently rapid, and a large range of convenient adjustment ought to be provided. Stationary gas engines appear generally to have these adjustments, but many automobile engines have been noticed that were practically devoid of them. Not a particle of lost motion is permissible in the wrist pin or crank pin bearings of the connecting rods of automobile motors, as its presence gives rise to an insufferable "knocking," and yet in many motors the wrist pin is of ordinary, unhardened material, and passes through a simple hole in the end of the connecting rod, not even bushed, and entirely unprovided with means for adjustment. When wear takes place at this point the only way is to make a new wrist pin and bore out and bush the connecting rod. This is an expensive job, and one that would have been unnecessary had an adjustment been provided.

The bearing of the

CONNECTING ROD AND CRANK PIN

is oftentimes provided with no other adjustment than a piece of paper between the halves of the bearing. This very unmechanical little trick may suffice to enable the bearing to be again made tight after the tool marks have been worn off in the early running of the engine, but hardly more, and does not make the bearing adjustable in any proper sense.

THE MAIN CRANK SHAFT BEARINGS

of automobile motors are very often plain brass bushings, and when they have worn down there is nothing to do but to make and fit new ones—a job which in itself would not be so serious did it not entail the complete disassembling of the whole motor. Not only does this frequent taking apart of an automobile involve much expensive labor, but it results in serious damage to the paint, the material of the body and the upholstering. Furthermore, nuts that are continually being removed and replaced are liable to be stripped and to become so loose as to be liable to loss. All things considered, the machines that frequently have to be taken apart depreciate rapidly in appearance if not in more vital respects. The crank shaft bearings of stationary gas engines are almost always adjustable. Otherwise, no one buying power for any serious purpose would accept them. It may be urged that the use of bearings with adjustments would involve greater danger of their working loose with serious results, but not be the case if the work we done.

It is in the

STEERING GEARS

of automobiles that the lack of a is most painfully and even dang parent. The stresses upon thes extraordinary, the bearing su constantly exposed to dust and they have no regular lubrication. no part of the whole automobil ism where backlash is more ob than in the parallel rod which the steering knuckles with the r gear, and in this gear itself, a motion is multiplied by the wo threaded screw, or sector mech ployed, and appears at the whee vexatious lack of positiveness in tion.

Unfortunately, however, mea justment of these parts are ve met with, and even the high chines develop backlash in thei wheels after remarkably little connections of the steering kn the parallel rod and of other p linkage are often made by mere holes in these forgings and inser The holes are not fitted with bushings and the pins are not and when the inevitable rapid place the only remedy is to bor bush the holes and provide new would seem that these bearings least be provided with hardened having tapered holes and hard pins to fit them. By suitably d the taper pin as looseness manif the mechanism could always be from lost motion.

THE BEARINGS IN TRANSMISSION

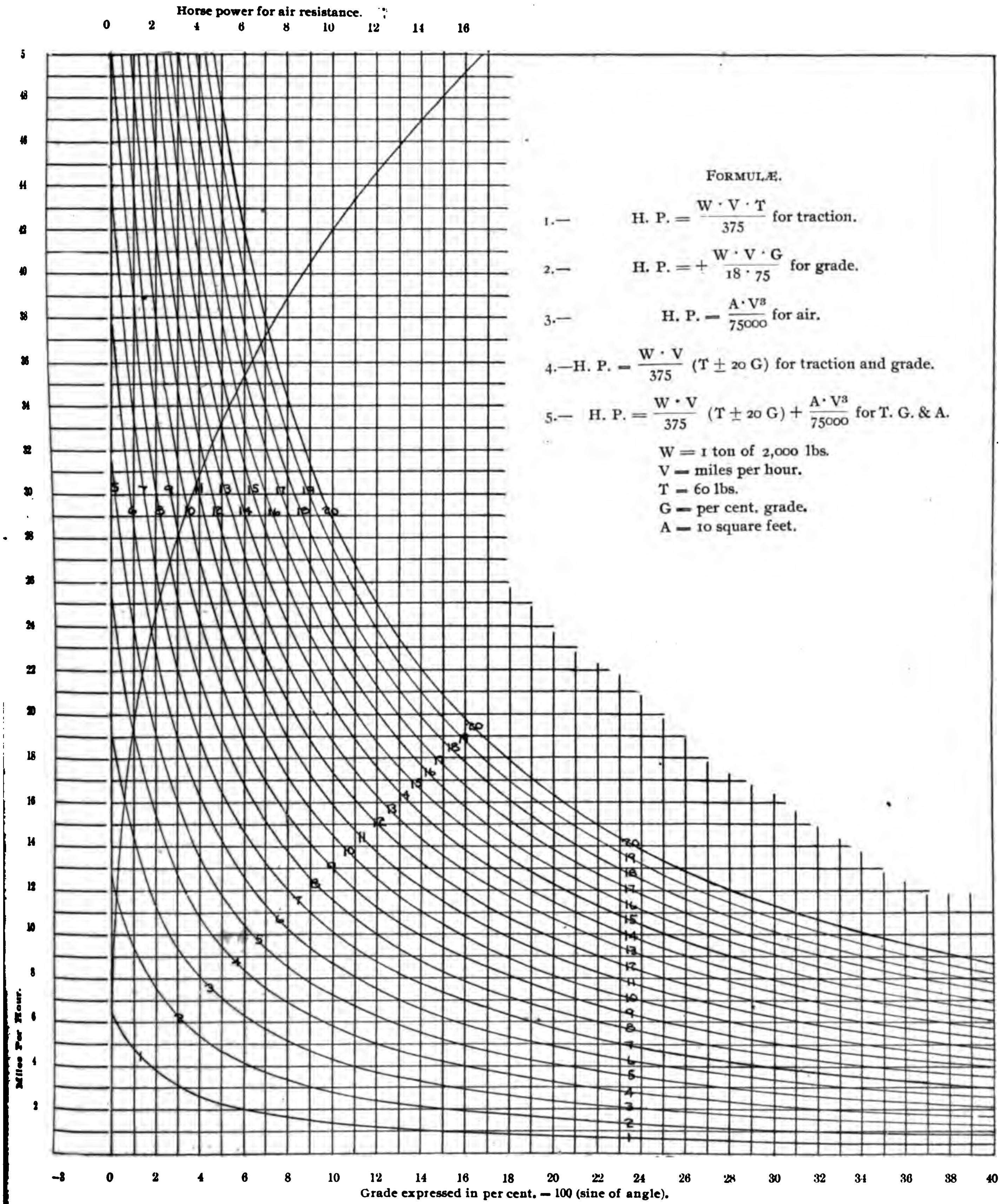
are not subject to quite such stresses as are other parts of th ism. Roller and ball bearings v less ultimately take the place of bushed plain bearings generally it may be remarked that some of makes of roller bearing were ver in means for adjustment.

It may safely be said that th bile, before it becomes a vehicle utility, must be completely prov bearings not only of the best we terial, liberal surface and lubric supplied with improved means up wear without the necessity of bling.

Traction, Grade and Air Re

By Reynold Janney.

An exact calculation of the ho required to run an automobile volve the consideration of many In preparing the accompanying the factors taken into account a ered under five heads, viz., wei velocity (V), traction and fricti ance on a level (T), grade (G)



FORMULÆ.

1.— $\text{H. P.} = \frac{W \cdot V \cdot T}{375}$ for traction.

2.— $\text{H. P.} = + \frac{W \cdot V \cdot G}{18 \cdot 75}$ for grade.

3.— $\text{H. P.} = \frac{A \cdot V^3}{75000}$ for air.

4.—$\text{H. P.} = \frac{W \cdot V}{375} (T \pm 20\,G)$ for traction and grade.

5.— $\text{H. P.} = \frac{W \cdot V}{375} (T \pm 20\,G) + \frac{A \cdot V^3}{75000}$ for T. G. & A.

W = 1 ton of 2,000 lbs.
V = miles per hour.
T = 60 lbs.
G = per cent. grade.
A = 10 square feet.

resistance dependent upon the area (A) exposed and the velocity.

We shall take as the basis of our calculation a well constructed vehicle weighing 1 ton of 2,000 pounds, and exposing to air resistance 10 square feet of surface. The pull required to keep such a vehicle in motion along a smooth, hard, level road has been found by experiment to vary from 40 pounds to 80 pounds, depending upon the exact character of the road. Sixty pounds is thought to be a fair average, and this is the value given to T. Its full meaning is that a vehicle weighing 1 ton will require a pull of 60 pounds to keep it moving at a constant speed.

One horse power equals the expenditure of 33,000 foot pounds of energy in one minute. In other words, if 33,000 pounds be raised 1 foot in one minute against the force of gravity the work done during the minute is at the average rate of 1 horse power.

But in preparing the chart it has been thought best to use miles per hour instead of feet per minute. As there are 5,280 feet in a mile, and sixty minutes in an hour, 33,000 foot pounds per minute is equal to $\frac{33000 \times 60}{5280} = 375$ mile pounds per hour; that is, 375 pounds lifted 1 mile in one hour would represent work being done at the rate of 1 horse power. If a carriage weighing 1 ton requires a pull of T pounds to move it at a constant rate of speed on a perfectly level road, the horse power required will be $\text{H. P.} = \frac{WTV}{375} \ldots (1)$, where W is the weight in tons, V the speed in miles per hour and T the pull in pounds per ton of vehicle. T in this discussion is taken as 60 pounds. If it is thought desirable to use a larger or smaller traction coefficient than 60 pounds for a different road, the resulting horse power will be increased or decreased in the same ratio.

But few roads are level, and we must determine the effect of grades. Formula 1 considers only the resistance of traction and friction. If the vehicle moves up a grade it must do so against the force of gravity, and will require the application of more power than is accounted for in equation 1. The whole weight of the vehicle will be lifted as many miles per hour as the road rises in the distance passed over in that time. This elevation is expressed in per cents, being so many hundredths of the distance passed over. In the following formula (2) the per cent. grade, G, is expressed as a whole number, and so is 100 times as large as the actual fractional inclination. Therefore, in figuring the pull required to raise the weight up the grade we find it to be per ton (2,000 pounds), and per unit of grade inclination $\frac{2000}{100} = 20$ pounds, and the formula for the horse power in lifting the vehicle becomes

$$\text{H. P.} \pm \frac{WVG}{18.75} \ldots (2).$$

The plus sign (+) is used for ascending grades and the minus sign (—) for descending.

Equations 1 and 2 combined give the horse power required to overcome both traction and grade; thus

$$\text{H. P.} = \frac{WTV}{375} \pm \frac{WVG}{18.75}.$$

Simplified, this becomes

$$\text{H. P.} = \frac{WV}{375} (T \pm 20\,G),$$

and this is the equation used in tracing all the curves on the accompanying chart, except the one for air resistance.

In studying the resistance of the air to the motion of bodies it has been found that the resistance per square foot is equal to $\frac{V^2}{200}$ pounds. To run a vehicle exposing A square feet of surface to the air at a velocity of V miles per hour against a resistance $\frac{V^2}{200}$ pounds would require

$$\text{H. P.} = \frac{AV^3}{75000} \ldots (3).$$

The single curve on the chart has been traced from this equation, and gives the horse power required to overcome air resistance alone in running a vehicle of 10 square feet surface at given velocities. It would be easy to combine all the formulæ, 1, 2 and 3, and draw curves representing the total horse power required to run a vehicle against the combined resistance of traction, grade and air; but as equation 3 involves the third power of the velocity, it would complicate the use of the chart, and for this reason the air resistance curve has been drawn separate from the others.

THE USE OF THE CHART.

An inspection of the chart will show a bottom line of figures indicating the grade in per cent., and a left hand column of figures, reading from the bottom upward, indicating miles per hour. The figures at the lower right hand end, and also for convenience distributed in three places along the curves, indicate the horse power represented by each curve.

To exemplify the use of the chart, let it be required to find what horse power it will take to run a vehicle at a rate of 20 miles per hour up a 13 per cent. grade. Follow the left hand column of figures up till 20 is reached, then follow the line marked 20 to the right until it intersects a perpendicular line extending upward from 13 at the bottom of the chart. The curve which crosses the intersection of these lines is 17, and it would therefore require 17 horse power to run a vehicle weighing 1 ton at the rate of 20 miles per hour up a 13 per cent. grade. If the weight of the vehicle is different, the horse power required will differ in like ratio; thus, if th weighs 1,000 pounds, it will take half the horse power required for weighing 1 ton. The table may used in a reverse order to find when the grade and horse power

An examination of the single air resistance shows that little produced by the air until a veloc miles per hour is attained. The u chart in problems involving high requires that this curve be taken count. For example, a velocity of per hour up a 6 per cent. grade quire 19 horse power for traction only, but the air resistance at 40 hour requires about 8⅝ horse pov must be added to the 19 hors making a total of 27⅝ horse p quired to overcome all resistanc velocity.

A minute study of the char many peculiarities. For instance, be drawn upward from a point t of the vertical zero grade line re a —3 per cent. grade, it stands in relation to the curves as the base line. In other words, these form the asymptotes to the curv dicate that the traction and frict ance assumed in the formulæ is the grade resistance of a 3 per c Another peculiarity is that in an involving equal numbers of grad age and horse power the velocity exceed 18¾ miles per hour. For 20 horse power on a 20 per cent. 50 horse power on a 50 per cent. 100 horse power on a 100 per c would never give a speed greater miles per hour, with a vehicle w ton.

How to Use Glue.

Complaint is often made of t of glue now supplied when it is user's own neglect that is respo failure. For glue to be properl it requires to penetrate the po wood, and the more a body of trates the wood the more subs joint will remain. Glues that longest to dry are to be preferre that dry quickly, the slow drying ways the strongest, other thi equal. For general use no me such good results as the followi the glue up small, put it into ar tle, cover the glue with water a to soak twelve hours. After sc until done. Then pour it into a box; leave the cover off until cover up tight. As glue is re out a portion and melt in the Expose no more of the made g atmosphere for any length of ti necessary, as the atmosphere i structive to made glue. Never glue in a pot that is subject to heat of a fire or a lamp. Neve wood, as the hot wood will abs water in the glue too suddenly, only a very little residue.—*Englis*

LESSONS OF THE ∴ ROAD ∴

Some Experiences with the Repair Sharks.

By Harry B. Haines.

With 5,000 miles of road experience behind me, I am perhaps qualified to pass a few opinions on the greed and rapacity of the repair men, blacksmiths, storage station fellows and others with whom the automobilist is forced to associate if he enjoys and indulges in long trips away from home.

It is scarcely possible, at the present condition of auto development, to undertake a trip of 100 miles or more and not have some little thing go wrong, and it is at times such as this that the man with the auto finds that he has fallen into the hands of the Philistines.

The prevailing impression from end to end of the country among men who profess to know anything at all about horseless vehicles seems to be that the private owner is legitimate prey for them, and that the proper method of dealing with him is to rob him to as great an extent as he will stand for, and then hold his machine until he pays up.

There are, of course, exceptions to every rule, but nine-tenths of the auto repair men in small towns are several degrees shy on conscience, and have no conception of what a fair price for work done means. They evidently work on the comedian's version of the golden rule which sets forth the wise principle of "Do others or they will do you," and as far as I know there are few cases on record where the auto owner was not done and done brown.

It is not only in small towns that the unscrupulous repair man resides, for I had about my worst experience right in New York city, under the very drippings of the L road. I had stripped a set of fibre gears at Fort Lee and managed to reach a repair station, in the neighborhood of 125th street, by running on the reverse gears. Having been "burned" once or twice before I made sure to get a price on the work, and the manager stated that the job complete would cost $7. I had him repeat the price in the presence of my friend, and we then left the place with the promise that the machine would be ready two days later.

To make a long story short, after numerous disappointments I received a telephone call a week later and went down to New York for the machine. Unfortunately my friend was not with me, and I entered the shop to find the carriage waiting for me, it being then on the third floor in the repair department.

The manager presented his bill and instead of its being $7, as he had agreed, it read $12.75. I at once protested, but he had a story ready about a misunderstanding and claimed that the price had been given in haste and under the impression that the job would not take so long. There were numerous hours of labor charged up at 60 cents an hour, and despite all my argument the manager remained obdurate, and finally announced that it was no use "chewing the rag" any more about it, and that if I didn't want to pay the bill I didn't have to, but I couldn't get the machine until I did.

There are different stages of highway robbery, but a man does not expect to be held up on Eighth avenue. There is not much distinction between the man who puts a revolver to your head and makes you shell out your cash and valuables and the suave fellow who lies to make a few dollars and refuses to let you have your auto when you are 20 miles from home and the sun rapidly going down.

I finally paid the bill under protest, not being in a condition or frame of mind to wait for the long legal process necessary to secure my machine; but I vowed that I would make that fellow pay for his dishonesty, and I believe I have succeeded, for there is not an owner of a machine within 30 miles of my house who does not know the story and will give the place a wide berth.

We have a very good scheme here of keeping tab on such places, each man reporting to his fellows his experiences in various places, and the shops which are run on the "grab all" principle are given a wide berth as far as possible, and when a call there is an absolute necessity a price is always insisted on before work is done.

A "Time" Charge.

It seems to be the general presumption that a man who can afford to own an auto can afford to pay well for everything that is done in connection with it, and he is certainly made to.

On one trip not so long ago I lost a bolt out of the end shaft of my machine on the transmission gear side, and I stopped at a small blacksmith shop near Rahway, N. J., to see if I could get it fixed. The blacksmith, who was a typical countryman, came out at my request and looked the machine over, and in a minute or so announced that he didn't think he would be able to fix it, as he had no bolts and nothing to make them with. I thanked him for his trouble, and closing up the carriage seat replaced the cushion and prepared to start. He was still hanging around, as if expecting something, and feeling in my change pocket I drew out a 10 cent piece and handed it to him. He looked at me as if I had done him an injury, and then laying down the 10 cents on the carriage seat he informed me that he wanted 50 cents or nothing for his time. This would have meant just 10 cents a minute.

I do not know whether nature has stamped my countenance in a manner that would lead persons to believe that I am an easy mark, but at any rate I coolly pocketed the 10 cents and without a word started my motor, climbed in the machine and started off, leaving the blacksmith standing in the centre of the road gasping and gaping like a fish out of water. I managed to run home with the bolt out and had it repaired there.

Water an Expensive Luxury.

Feeling that I needed water after a 40 mile run one afternoon I stopped at a storage station near New Brunswick, N. J., and not wishing to ask for the water without buying something I entered the place and purchased a gallon of gasoline. I requested that I be allowed to get some water, having my own collapsible pail; but the proprietor of the station insisted on getting it himself and brought out a pailful to me.

He stood by me while I filled the tank, and then when I asked him how much I owed him he replied 40 cents. I asked him if he charged 40 cents a gallon for gasoline, and he replied that he had only charged 15 cents for that and the other 25 cents for the water.

This statement was a body blow, and I asked him if he really meant that he charged for water, only to receive the reply that he did. The fellow evidently seemed insulted that I should question the propriety of such a course, and informed me that the water was his and he could charge for it if he saw fit to do so.

He raised such a howl about the matter that I finally paid him, and when I reached home and told of my experience I learned that I was not the only one who had been imposed upon, as two other local owners had fallen into the same trap a few days before. It is needless to say that I do not ask for water at auto stations any more.

Getting Even for Once.

That it is the object of the repair men in many cases to charge exorbitant prices was proven to me by my own experience at a leading summer resort on the Atlantic Coast where I spent my vacation this summer. The fellow there had the only storage and repair station in the place or within a radius of 20 miles, and at the rate he was making money when I left his place he will soon have Mr. Morgan outdistanced in the financial race.

He charged $1 a night for the storage and cleaning of autos of the runabout type, while the owners of two seated vehicles were compelled to pay $2 a night. There was no rate by the week, and no matter how long a person stayed it was a case of $1 or $2 a night straight. In repair work he charged 60 cents an hour straight, and absolutely refused to give a price on any job, not accepting the work unless the owner of the machine agreed to pay the 60 cents for each hour and let him charge up the time.

It cost me $3.75 to have a stud bolt tapped out and a new one put in, a job which would have been done at home for

about 50 or 75 cents, and which could not have taken over an hour to do.

I left my machine one day to have some little repair made and was informed that it would not be ready until the following morning. That night, while walking about town, I noted a machine standing in front of a house which looked suspiciously familiar to me, and walking over to it I discovered that it was my auto.

The person using it had evidently gone off somewhere; but without saying a word to anyone I started the motor and rode off. I kept the machine in the hotel yard that night, and the next morning went down to the storage station to get it.

The manager was evidently highly excited, and when I asked him if my machine was ready he inquired my name, despite the fact that he knew me well, and did many other things which showed me that he was sparring for time. He finally went inside to the repair room, and a moment or so returned and told me that the workman on my machine had been taken ill and been unable to finish the job, and that if I returned in the afternoon it would most likely be done.

I thanked him and left, giving no indication that I knew the truth, and in the afternoon, just for the joke of the thing, I got out the auto and with a friend for company rode up to the repair station and stopped. The manager came to the door in response to my summons and I inquired if my machine was ready. Even then he did not recognize it, and in order to prevent further lying on his part I let him know that I was aware of his having rented the machine out, and I demanded my leather initials, which he had taken off the back.

There was no loophole through which he could escape and he gave me the initials most sheepishly. He had a bill against me for $3.50 for work done; but despite the fact that he knew I was going away the next day he did not present it.

I asked him how much I owed him, and he replied that there was nothing due him. This was a surprise; but I considered the use of the machine worth as much as his bill, and I did not force him to accept my money. That was the only time I ever came out even with an out of town repair man, and I am inclined to believe I shall never be as fortunate again. I afterward learned that he had notified the police of the supposed theft of the machine and spent several dollars in telegraphing around the country about it.

I might continue for another column with just such incidents as these, but I believe my fellow auto owners have experienced them all and know as much as I do about such things.

One fact is self evident at the present time, however, and that is that the man who runs an auto wants a large pocketbook and one he can get at easily. He must submit to being overcharged when he cannot help himself and fight against it when he is in a position to do so.

He has at present, in my opinion, about one chance in ten of getting a fair return for his money or coming out without a heavy loss; but all that is in the game, and adds relish and interest to the sport.

It is to be regretted, however, that such is the condition of things, for what with adverse legislation and a growing sentiment against autos, due to reckless driving at express train speeds, the horseless vehicle and its owner may have a hard row to hoe for the next few years.

The Item of Cost.

By Daniel Longaker, M. D.

Many users of power driven vehicles will sooner or later be forced to consider the item of cost. This is particularly true of physicians and all who attempt to use automobiles in their business. After an experience of a little over twenty-five months of exclusive gasoline driving, I am prepared to say that the estimate of Harry B. Haines, based on five months' use, is much under the actual cost. Had he stuck to the machine a little longer, perhaps a year in all, I am sure his net cost per mile would have been doubled. He is putting the matter in too rosy a light, although even his modest figures of $331, representing the cost of five months' driving, may be too high for many. Nine cents a mile! And the old catalogues tell us you travel 20 miles on 1 gallon of gasoline—half a cent a mile—cheaper than walking! Twenty-five months surely will serve as a basis for a truer estimate of actual cost. The longer and continued use serves to bring out inherent weaknesses of construction, shows up bad material and often worse workmanship, and demands consequent extensive and expensive repairs.

But the cause most prominent of all in sending the cost of operating these machines upward is the remarkable and rapid depreciation of their selling value. I shall presently give some figures, including depreciation. Another one of the items of cost that is entirely too high is that of repairs.

Two experiences in two up to date shops will give the reader a better idea of what too often happens than volumes.

EXPERIENCE ONE.

My new machine suddenly developed a knock that could be heard three blocks away. The crank connection had very slight play, which was tightened; the two screws holding the piston pin were loose, one being in the bottom of the crank case. These were replaced and tightened, but the knock continued as hard as ever. My repair man gave it up and I sought other advice. With the help of the new adviser the trouble was located in a loose flywheel. Many disconnections had to be made in order to remedy the "looseness," and I soon learned that there was more to it than to remove six bolts and take off the body.

A day or two later I was informed that the job was done, everything back in place, but standing by the side of the machine we saw gasoline drip down. The tank had sprung a leak, and this was located at the junction of the tube that fed the carburetor. Nothing remained but to remove the body again in order to solder the connection. And now to the point: this cost just $8 and consumed sixteen hours. It was a legitimate item of expense, but I will say my boy has on several occasions since done the same work in the course of an afternoon. He is not a machinist, nor is he paid 50 cents an hour.

EXPERIENCE TWO.

My machine had received a complete overhauling at an expense of over $70. For four long months it had behaved well, bringing me home on time daily, but latterly full power had not been developed.

To my great disappointment I soon found the overhauling had been of little service. We made a 15 mile trip out into the country and got back, although the machine ran badly. Next day it did still worse, and I had several halts in the street, but got home. The battery and wiring appeared good; also the mixture and the compression. My machinist told me the whole fault lay in my battery. He came to this conclusion because some dry cells apparently made the idle motor run better than my wet battery.

There is one thing, however, of which I am sure, and that is the unreliability and expensiveness of the dry cell. Therefore I would not go back to it, and decided to recharge the battery and rewire the whole outfit. Thus equipped, my boy and I started out a few days later, but we did not go far.

We had barely gotten to the other side of the street when we realized the only thing to be done was to go back—the engine missed worse than before.

At this juncture I asked the machinist to get to work to find out the trouble and remedy it. Two days later I was rewarded—my appeal had stimulated him to a successful hunt. It was discovered that the cam opening the exhaust valve had become loose on its shaft, to which it had been secured by brazing. This prevented the proper opening and closing of the exhaust valve, and aspiration and compression of the charge were in consequence most irregular as to time and amount. The exhaust valve would remain open during a part of the suction stroke, and the engine ran badly. It had never behaved thus, and I think if it should ever develop a similar disease I would soon locate its cause.

The crucial part of this episode bears on the item of expense. This second repair bill amounted to some $60, and included a charge for storage.

One hundred and thirty dollars in midwinter in one month for ordinary repairs! I did my duty nobly to that shop, and was its main support for a short time. During the week the machinist and his helper were

not at work on my machine they were walking around a part of the time with their hands in their pockets.

Guessing is sometimes resorted to when repairs are undertaken. This is plain, and that it is costly my experience, as just detailed, shows.

The appended figures of cost of operation are carefully compiled from my note books:

Gasoline auto, June, 1900 (new).	$1,200.00
Lamps	15.00
Freight	35.00
Auto barn	250.00
Cylinder and lubricating oil	30.00
Gasoline	132.00
Batteries	78.45
Tires	166.06
Soldering leaking water tank	17.90
Repairs—Carriage builder	78.40
" "Mechanical expert"	236.14
" P. Auto Company	35.85
" B——	104.47
" Auto company	181.73
" Auto company	78.65
" H. R., Jr.	6.00
Painting	35.75
New material, gears, axles, etc.	33.75
New material, chains, etc.	17.29
Advertising	6.75
Total	$2,709.49
And add two years' interest on $1,490 at 5 per cent	149.00
Total	$2,858.49
I have just sold the machine for	$250.00
This leaves a net cost of	$2,858.49
Less	250.00
Total	$2,608.49

From June, 1900, to August, 1902, is exactly twenty-six months.

The cost of an odometer should have been added, and some small items besides may have been overlooked, not many, however. As the odometer registered up to 1,800 miles and then went to limbo, I am obliged to guess my mileage. It is about 12,000.

12,000)$2,608.49(.21¾
2,400.0
—
20,849
12,000
—
8,849
—
12,000

Which gives a net cost of .21¾ cents per mile.

However, I have no desire to go back to the horse, and my business driving will continue to be by automobile.

I am convinced that the power driven vehicle, so eminently ideal, especially for the physician, will soon be a practical, commercial fact. I hope in future communications to point out some of the reasons of the failures of the past, that they may be minimized and avoided; likewise, I hope to have a far less doleful tale. It is only fair to add in conclusion that a small part of the amount spent in repairs went on my second carriage, which was put into commission late in November, 1901.

In order to depend on the auto as my exclusive and only means of driving I was compelled like some others to own two machines, both being gasoline. The vast improvement of the second over the first, in simplicity, better design, cleanliness, quietness and "greater willingness" to go a greater period without demanding partial rebuilding leads me to be very hopeful of the future.

In the meantime, brother physicians, you who have actually driven machines of good, ample proportions a year or two exclusively, let us have your figures; you also who have driven the steamers, which gave early promise of great things. And in your estimate, don't forget to put some value on the many hours you willingly or otherwise devoted to your hobby in order to keep it going by your own handiwork. And did it always pay to try to save the machinists' bills thus? Let us have the truth, the truth only and the whole truth.

...COMMUNICATIONS...

Bevel Gear Drive—Advertising Value of Races.

LONDON, September 4.

Editor HORSELESS AGE:

In your issue of July 23 I read with great interest your article on "Direct Bevel Gear vs. Chain Drive." There is one point that you have not referred to in your article, the very point which caused us to adopt the bevel drive for our racer, that a racing vehicle is made to go at its topmost speed, and when racing in France one practically never uses anything but the top speed. Now, on our racing car we sacrificed practically everything to reduce to a minimum the friction on the top speed, and none of our gear was in mesh or any gear wheels revolving when on the top speed. It practically came to the engine driving with one through shaft straight to the back axle. This car, although very effective for racing and wonderfully efficient on its top speed, was hardly, I think, so efficient on the other speeds as an ordinary chain driven car, and I could only consider it a success, looked at as a purely racing vehicle.

I thoroughly agree with you that so far as a test of vehicles is concerned, a really long tour with every little thing done to the car carefully recorded, is infinitely better than running under observation, but just at the present time racing seems to interest a large number of people, and gives wonderful publicity to the manufacturers who are successful in it. As a business man I recognize this, and therefore participate, and build racers for the purpose, but at the same time we are really much stronger on the touring side of the development of autocars than on the racing.

A gentleman from your side has recently been running one of our 16 horse power touring cars over Europe, and I enclose you a copy of one of our papers referring to the subject. Really, people ought to realize that tests like this are better than fifty races, but although people notice this with interest it has really little effect on the business. I may say that I very often get most interesting lines of thought from your paper, which is very different from anything we have over here, being exceedingly useful from a technical point of view.

Your correspondence column particularly interests me, and I approve of your principle of commenting very fully on the correspondence under the particular letter. It does not seem to be done much here, and I think it is a good and most useful innovation, as it does not allow correspondents' erroneous ideas to go out into the world unchecked. S. F. EDGE.

P. S.—When are we going to see your Mr. Winton over in Europe? He seems to have got a very likely looking car, judging from the illustrations.

Agricultural Motor Truck Wanted.

FAIRFIELD, Conn., September 12.

Editor HORSELESS AGE:

I am in search of the very best traction wagon for freight use or farm use on good, hard country roads. Is the best made abroad or in this country? Of course, I refer to some motive power other than horses.

I shall appreciate any information you may be able to give me.

FRANCIS H. BREWER.

[We leave our readers to answer this inquiry, the last of several we have lately received on the same subject.—ED.]

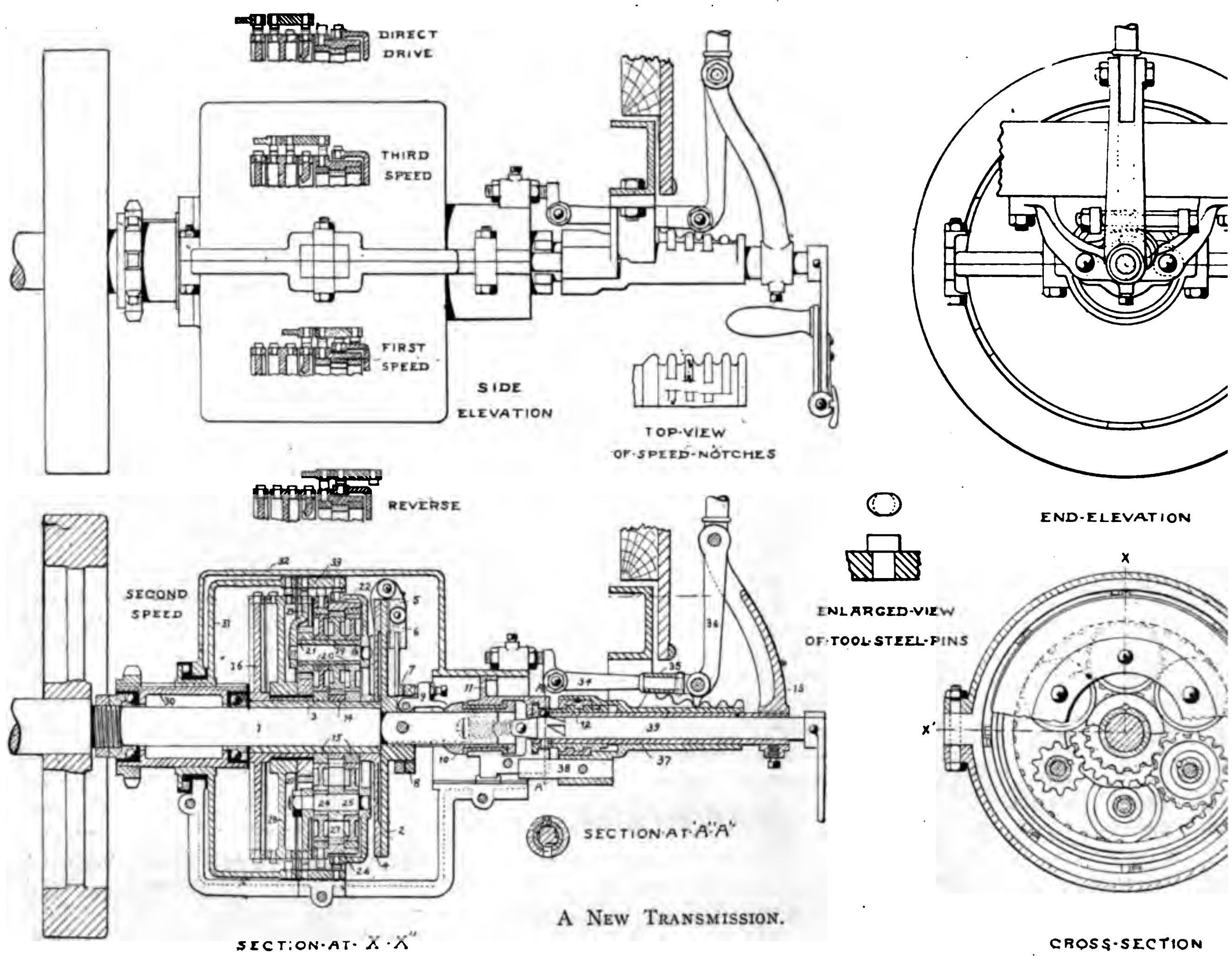
A New Transmission

716 CAXTON BUILDING,
CLEVELAND, Ohio, August 30.

Editor HORSELESS AGE:

In one of your recent issues I noticed a plea for a more positive control of the planetary change gears, so I have taken the liberty of sending you a blue print of such a gear, on which I have applied for patents. This transmission gives three speeds forward on the gears, a direct drive for the high speed without any idling gears, and a slow reverse. Referring to the drawing, the following is a brief description of the parts shown:

1, extension of crank shaft; 2, clutch disk keyed to 1; 3, sleeve loose on 1; 4, clutch disk feathered on sleeve 3; 5, one of four arms pivoted on disk 4, etc.; 6, clutch shoe pivoted on arm 5; 7, loose ring carrying the ends of arm 5; 8, loose ring carrying



A New Transmission.

the ends of adjusting screws; 9, one of three dogs pivoted on disk 2; 10, clutch cone; 11, split bushing, which transmits the lateral motion of 12 and is prevented from revolving by 38; 12, sleeve to which is fastened a threaded portion; 13, arm keyed to 12, which revolves the sleeve and thus sets the clutch; 14, gear keyed to 3; 15, roller races keyed to 3 and equal in diameter to the P. D. of gear 14; 16, disk keyed to 3 and having pins in its periphery; 17, one of three studs fast in 22; 18, bushing loose on 17; 19, gear keyed to 18; 20, rollers keyed to 18 and equal in diameter to the P. D. of gear 19; 21, gear keyed to 18; 22 and 23, hubless side plates carrying studs 17 and 24 and having pins in their outer circumferences; 24, one of three bolts fastening plates 22 and 23 together; 25, bushing loose on 24; 26, internal gear with pins in its periphery; 27, roller races equal in diameter to the P. D. of internal gear 26; 28, wheel loose on 16 and having two rows of pins in its outer circumference; 29, gear riveted to wheel 28; 30, ball bearing sleeve with sprocket attached; 31, broad rimmed wheel feathered on sleeve 30 and having pins extending radially inward from the rim; 32, case in two parts feathered to bushing 11; 33, rim rigidly attached to case 32 and having two rows of pins extending radially inward; 34, link connecting case with lever 36; 35, fork pivoted on link 34; 36, operating lever carried by arm 13; 37, casting carrying operating lever and bolted to carriage frame; 38, stud, fast in casting 37, extending into bushing 11 and preventing it from revolving; 39, starting lever.

The control is by a single lever, 36. A movement in the direction of the engine shaft selects the speed, while a movement at right angles thereto sets the clutch.

To guard against kicking back of the engine while starting notches are milled in the starting lever shaft, which come in line with the ball in sleeve 12 when the pin in the crank is in the ratchet notch in the engine shaft. As the crank is turned the ball drops in and out, but should the engine kick the ball would jam between lever 39 and sleeve 12, causing them to revolve together; but as sleeve 12 is threaded, lever 39 is carried outward, which disconnects it from the engine. E. A. Nelson.

Explosive Engine Query.

Editor Horseless Age:

Please explain in the next issue of your journal how to remedy a trouble which has certainly got me guessing:

I have three machines to repair, each of which seems to have the same trouble. They run all right when running slowly, but when I try to speed them explosions and run very irregula

I have tested the batteries and to be up to standard voltage. coil seems to be all right, as it g and steady spark. I have tried th in every position and get poor re find no short circuit in wiring.

The trembler spring seems to the adjuster screw on same at ti platinum on the spring seems t in other words, to become burn

The valves on the engine are s ly, and the springs seem to be tension. Chas.

[If the engines run regularly speed and irregularly at high spe sign that some working part, eit the valves or the igniter, does n properly at high speed. A too haust valve spring might produ sult you describe, but the troubl likely to be with the igniter—i. e. trembler. If the points fuse or would seem to be too much spark trembler, which could be remedie necting a condenser across the terminals, or, what is the same, terminals of the primary windi coil. If this should not prove to benefit it would be advisable to with buzzer and a simple rotary stead of the trembler.—Ed.]

A Pleasant Tour and a Record Climb.

Editor HORSELESS AGE:

It may interest your readers to know that, accompanied by a friend, I have just returned from a 700 mile trip through the White Mountains made in a gasoline touring car, and that we climbed Mt. Washington in the record time of fifty minutes, making the descent in forty minutes.

The machine went up without a hitch or stop from bottom to top, a distance of 8 miles, with a rise of nearly 5,000 feet.

Although this is the seventh machine to climb Mt. Washington, none other, I understand, has approached this time or made the trip without a stop. Our trip lasted eight days, and we made over 700 miles, and were delayed only by a punctured tire and a broken spring.

A. W. COMSTOCK.

No Fear of a Shortage of Gasoline.

We are informed on good authority that there need be no fear of a shortage of gasoline or of its price becoming prohibitive.

The reason for the recent advance in price has been ascribed to the fact that the crude oil has of late yielded a smaller quota of naphtha, this being due, it is surmised, either to climatic conditions, or to the peculiar characteristics of the oil wells from which the supply has been obtained.

While we have been unable to gather the exact reason for the recent advance in price, we have been assured that the cause thereof is now well in hand, and that the producers thoroughly appreciate the necessity of continuing to supply gasoline at a reasonable price in order to retain trade in this commodity for automobile purposes.

BEGINNERS PAGE.

Water Tube Boilers.

Methods of feeding the boiler and of regulating the feed will be considered with advantage at a later period, and we now pass on to the second class of automobile boilers, water tube boilers.

CIRCULATION.

The water in the lowest part of a boiler always heats most rapidly, because at that part the flame is most intense. The water at the lowest part being at the highest temperature, it tends to rise, owing to the expansion caused by the heat, and likewise the water higher up in the boiler, which is the coolest and therefore the densest, tends to flow downward, thus giving rise to what is called boiler circulation. In order to insure rapid generation of steam—in other words, to obtain a large amount of power from a comparatively small boiler—there must be a strong circulation in the boiler. In the case of a fire tube boiler heated evenly over its entire lower crown sheet the water has the same tendency to rise at every point of this crown sheet, and the tendency of the cooler water to flow downward is the same over the entire cross section of the boiler. The upward and downward currents resulting from these tendencies therefore interfere with each other and there can be no very strong circulation in a fire tube boiler.

The chief aim in the design of water tube boilers is to provide separate paths for the rising and down coming currents and thus facilitate circulation.

SCALE FORMATION.

All so called "hard" water holds in solution lime and other substances which are precipitated when the water is heated. The precipitate is heavier than water and sinks to the bottom of the boiler. If no steps are taken to remove it, it will in time form a thick crust of scale on the walls of the boiler, and as these substances are very poor conductors of heat the evaporative efficiency of the boiler is thereby greatly impaired. To prevent this reduction in evaporative efficiency two methods are available. While the boiler is in operation the sediment is held in suspension by the water, and by opening a cock in a pipe leading into the bottom of the boiler the water holding this sediment is drawn off, an operation called "blowing off." This method is generally relied upon to keep automobile boilers free from scale, and seems to serve fairly well where the water is not too limy.

However, some forms of water tube boilers, those on steam trucks especially, are provided with a mud drum at their lowest point into which the sediment settles, and which is so arranged that it can be easily opened and cleaned out.

The number of water tube boilers, which have been invented for various uses, is legion, but so far only two seem to have found extensive application in steam carriages; these two we shall now describe.

Fig. 1 illustrates a water tube boiler with superheating coil, used on one of the best known American steam carriages. This boiler has a water and steam chamber composed of an outer seamless steel shell A and an inner similar shell B, flanged and bolted together at top and bottom, as shown. Within the space enclosed by the inner shell are arranged eight spiral coils, slightly cone shaped, vertically in line with each other. Seven of these coils act as generating coils,

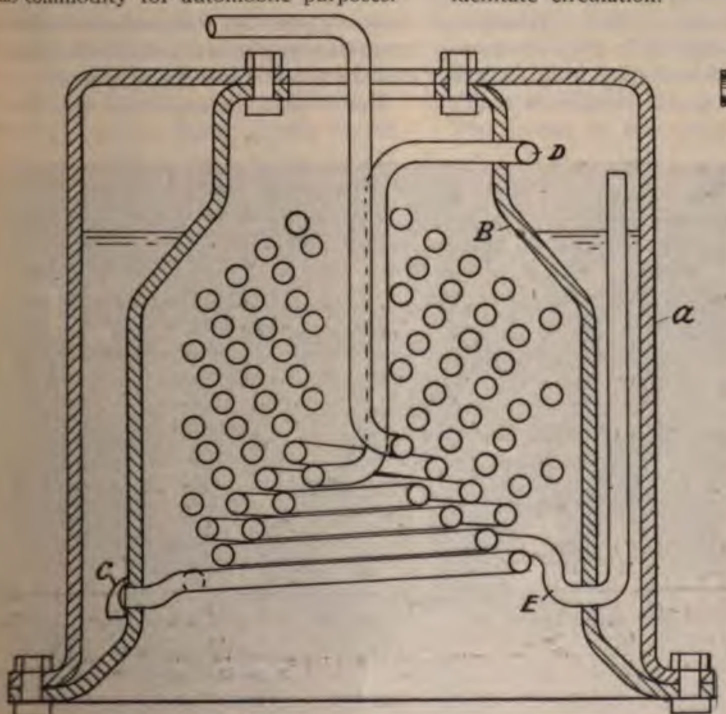


FIG. 1.

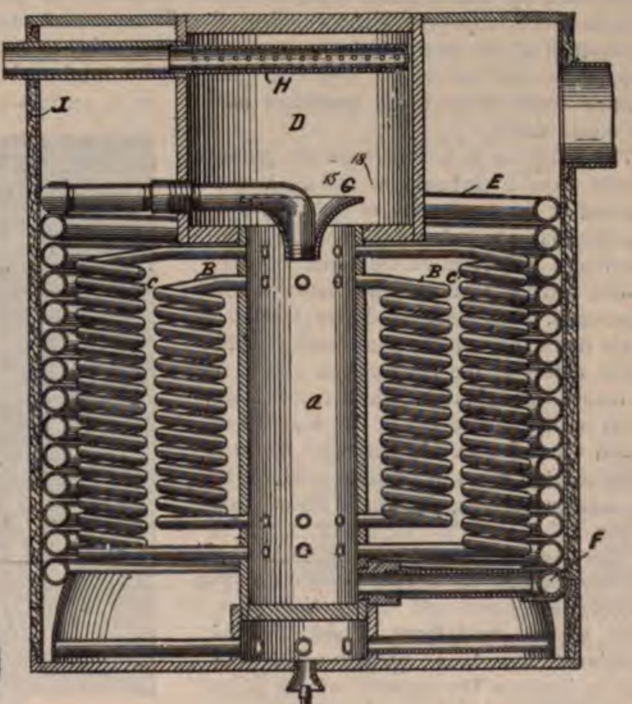


FIG. 2.

and one, the second from below, as a superheating coil. All the generating coils communicate with the water and steam spaces formed by the two concentric shells above and below, respectively, by means of conical joints with the inner shell. All the joints at either end of the coils are in line with each other and are evenly spaced over the circumference. At the lower joint of the tubes a deflector plate C is fastened to the tube, and at the upper joint the joint fitting comprises a bent nozzle D. The effect of the deflector plate and bent nozzle is to give the water in the water chamber a circulating motion in a horizontal direction.

The second coil of tube from below, E, extends upward through the water in the water space into the steam space, and the other end of this coil leads to the throttle valve and engine. It is obvious that only steam passes into the superheating coil, since the inlet is above the water level, and only such moisture can pass into it as the steam may hold in suspension. The passage of the steam through this coil evaporates any moisture the steam may contain, and superheats it. Like all other automobile boilers this one is lagged with asbestos, but the lagging is not shown in the drawing.

In Fig. 2 is shown another type of water tube boiler. This boiler comprises a vertical standpipe A and two series of helical coils B and C, communicating with the standpipe at the top and bottom. The standpipe A communicates with a sort of steam dome D above it. The stand pipe and the two series of coils are surrounded by a helical coil E of pipe. This coil ends at the bottom, at F, in a T, one branch of which takes a pipe leading to the bottom of the stand pipe and the other branch the feed pipe. At the top this coil communicates with the central stand pipe, the end extending downwardly. A baffle plate G is fastened to the downward extension of this pipe, which serves the object of preventing water from being projected into the steam dome.

The water, as it arrives from the pump, travels from F through the coil E, is discharged at the upper end of that coil into the stand pipe A, sinks to the bottom of the stand pipe and rises in the series of generating coils B, C, in which it is converted into steam. The steam is drawn from the steam dome through the perforated pipe H.

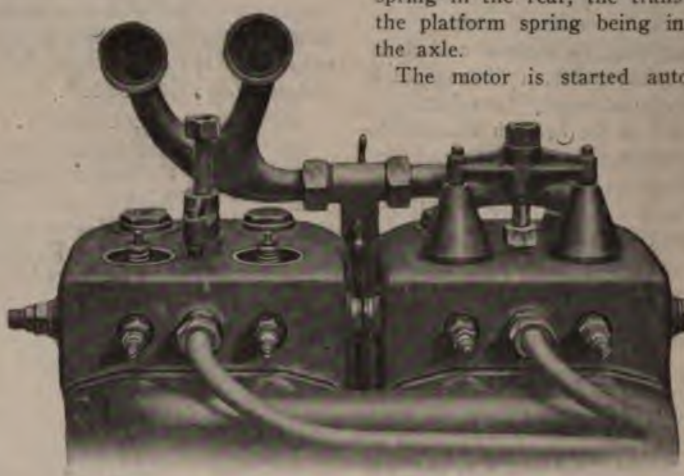
The object of the large helical coil E is to reduce the radiation of heat through the boiler walls, and to act in the capacity of a feed water heater. Radiation of the heat from the hot gases is further reduced by an asbestos lagging I over a sheet iron casing.

The Columbia Lock Nut Company have moved their office and works from New York city to Bridgeport, Conn. Special machinery has been devised which will greatly increase the capacity of the plant and hereafter all their goods will be accurately sized and true to U. S. standard.

NEW VEHICLES AND PARTS.

The New Charron, Girardot & Voigt Machine.

The first Charron vehicle built in America, at the company's works in Rome, N. Y., has recently been completed. A photo of the machine is shown herewith.



THE MOTOR HEAD, CHARRON, GIRARDOT & VOIGT.

It is a tonneau with aluminum body, built by Quimby & Co., of Newark, N. J.

The motor is a four cylinder upright one of 15 horse power. A notable feature of the motor is the method of fastening down the intake valve cages, as illustrated in the cut, Fig. 3. The intake pipe leads from the carburetor upward on the side of the cylinders, ending in a T, the two opposing branches of which have connected to them, by means of pipe unions allowing of relative rotary motion of the connected parts, two cast fitting, each of which forms the cap and inlet fitting for two inlet valves. These caps are clamped in place by means of a yoke, a stud projecting from the cylinder head and a nut. Simply loosening the nut permits of swinging the yoke around the stud and then swinging the intake fitting around the connection with the intake pipe, thereby exposing the valves. This is shown done at one side of the illustration.

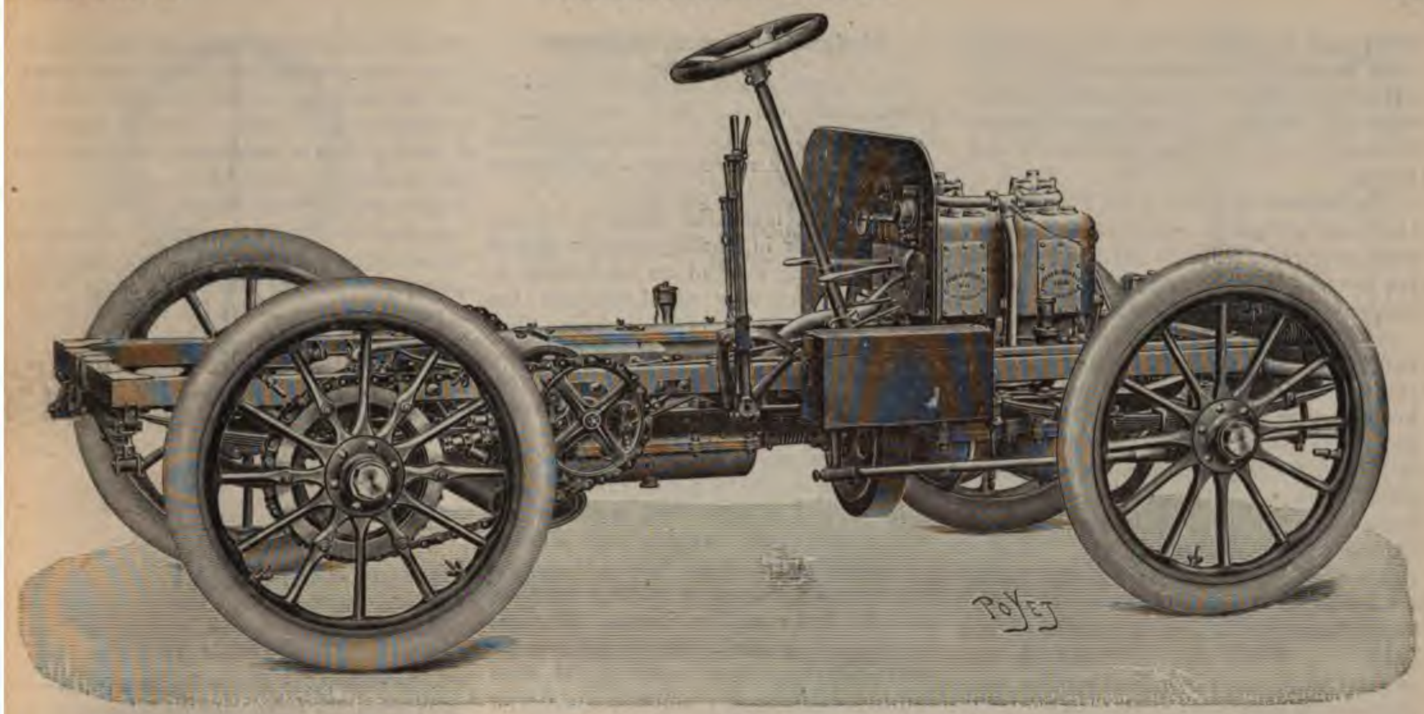
Fig. 3 is a side view of the frame or chassis. Semi-elliptic springs are used to suspend the body in front and a platform spring in the rear, the transverse part of the platform spring being in the rear of the axle.

The motor is started automatically by means of an electric button, as are some other four cylinder motors. A novel form of carburetor is used, which is provided with a jacket for the circulation of the warm engine water.

The transmission gear is of the shifting type and gives four forward speeds and one reverse, the highest forward speed being claimed to be 40 miles an hour. Ball bearings are employed to take up the end thrust of the bevel gears. A novelty in the construction of the transmission is that the two parts of the counter, or differential shaft, are provided with universal joints to prevent any binding in the bearings in case they should become disaligned.

The vehicle is provided with a foot

NEW AMERICAN BUILT CHARRON, GIRARDOT & VOIGT MACHINE.



CHASSIS OF THE CHARRON, GIRARDOT & VOIGT CARRIAGE.

brake acting on the differential gear on the countershaft and a hand emergency brake acting on drums fastened to the driving wheels. The latter is, of course, double, and is of the expanding ring type and double acting; it is so constructed that the reaction of the brake resistance is taken up by a rod pivoted to the frame and that the wheels can be taken from the axle without disturbing the brakes.

The weight of the vehicle complete is 2,020 pounds.

The Transmission Gear of the Toledo Gasoline Touring Car.

We illustrate herewith the transmission mechanism of the 16 horse power gasoline touring car manufactured by the International Motor Car Company, of Toledo, Ohio. Fig. 1 is a vertical section of the transmission including the clutch and flywheel, gears and clutch pedal. Fig. 2 shows the transmission mechanism with the upper half of the aluminum transmission case removed. The reverse gears are not shown in Fig. 1, but are plainly seen in Fig. 2. While this transmission is of the common sliding gear type, it possesses a number of features worthy of special mention.

Referring to Fig. 1, H is the engine shaft which is elongated and carries at its extremity a ball thrust bearing *a*, against which the outer end of the clutch spring A presses; the other end of this spring presses against the clutch member *b*, thus holding the clutch in driving relation to the flywheel member B. The object of this construction is to equalize the end thrust in the main bearings of the motor shaft.

The tension of the clutch spring A is regulated by the nut and check nut at the extremity of the engine shaft; these nuts are accessible upon turning a movable sleeve exposing the angular space I into which a suitable wrench may be inserted.

M is the clutch pedal and 9 the fork which actuates the movable clutch member *b* when the pressure of the foot is applied to the pedal M.

The primary shaft (Fig. 1) carries three pinions, 1, 2 and 3, while the secondary shaft S carries three gears, 1′, 2′ and 3′. When pinion 1 is in mesh with gear 1′ the vehicle is running on the first or slowest speed; when No. 2 pinion is in driving relation to gear 2′ the carriage is running on the second or intermediate speed, while the high speed is obtained when pinion 3 is driving gear 3′, as shown in the illustration.

The secondary shaft carries the driving

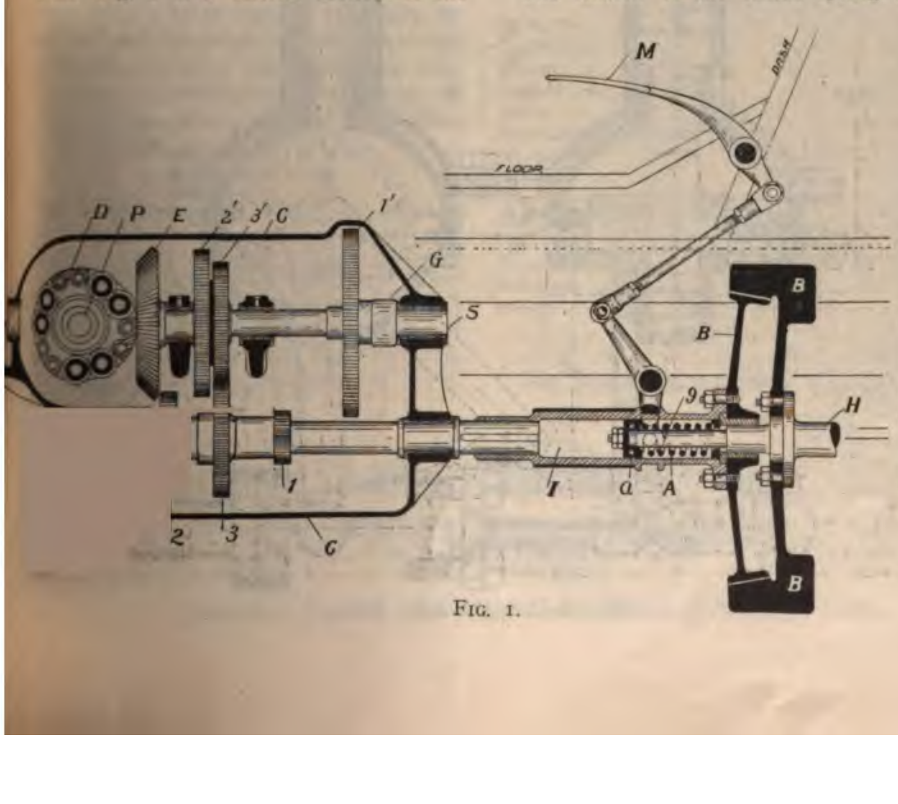


FIG. 1.

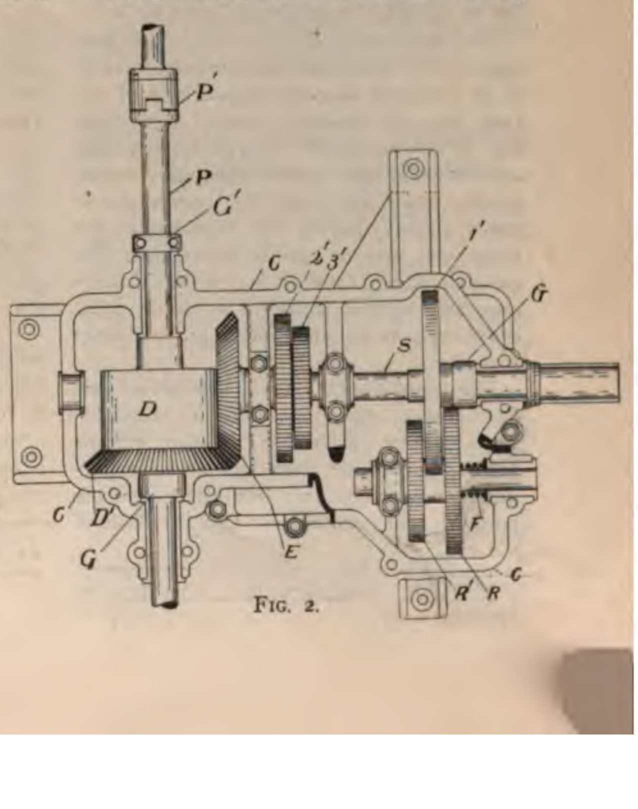


FIG. 2.

bevel gear E, which is in constant mesh with the gear D' attached to the end of the differential D, thus driving the countershaft P. (See Fig. 2.) Ball thrust bearings G and G G are fitted to take up the end thrust.

The pinions 1, 2 and 3 on the primary shaft are shifted by means of a yoke or fork suitably attached to the hand operating lever, which fork engages in the groove between pinions 2 and 3 (Fig. 1).

As shown in Fig. 2, the reverse gears R and R' are mounted on a short separate shaft provided with suitable bearings below the secondary shaft S and in front of the primary shaft. The reverse is operated in the following manner: Moving the change speed hand lever to the reverse position when the first speed gears are in driving relation shifts the pinion 1 until it meshes with reverse gear R. A further movement of the reverse lever causes both reverse gears R and R' to move with the pinions of the primary shaft, the driving relation being maintained between pinion 1 and reverse gear R until the reverse gear R' meshes with secondary shaft gear 1'. When the driving clutch is released the pinion 1 (Fig. 1) is in mesh with the reverse gear R (Fig. 2), and the reverse gear R' is in mesh with the secondary shaft gear 1'. The interposition of the reverse gears between the driving pinion 1 and the secondary shaft gear 1' causes the secondary shaft to rotate in the opposite direction as when directly driven by the primary shaft pinion 1.

When the speed lever is thrown forward in order to engage the first forward speed gears, the spring F (Fig. 2) forces the reverse gears back into their original position, and they remain idle until again called into requisition by reversing the change speed lever.

This transmission mechanism is claimed to be made in the best possible style. All of the gears and pinions are cut from drop forged blanks made at the factory of the company at Toledo. The teeth are beveled off to facilitate their proper meshing.

The differential D is of the spur gear type. The aluminum transmission case C is so arranged that the upper half of the case may be removed without disturbing any of the mechanism within, while a suitable covered observation opening is made in the upper half, and by removing the cover of this opening the condition of the gears, etc., may be readily determined. The movable clutch member *b* is cast of aluminum and leather faced. The clutch pedal connecting links and forks are all drop forged.

The transmission case is kept about half filled with a heavy lubricating oil which insures perfect lubrication of the various parts; the outside secondary and countershaft bearings, etc., are lubricated from the pressure lubricator attached to the dash of the car.

A. C. A. Reliability Run, October 15. Price 10 cents.

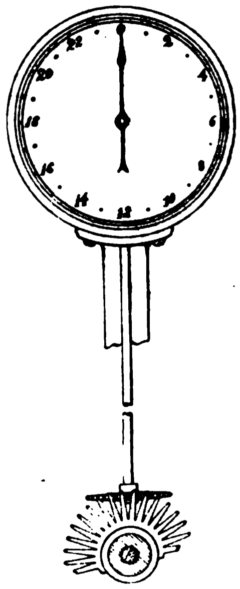
Hodgson's Speed Indicator.

We illustrate below the device for which patent application has been made by E. J. Hodgson, of Minneapolis, Minn., and which has received extensive notices in the daily press recently.

The sketch is a side elevation of the speed indicator in working position applied to the running gear of an automobile at either front or near wheel, between the wheel and the body of the vehicle. The number of figures on the dial is to be increased to, say, 36 units, and an inner row of figures is to continue up to 72 units on the second turn of the index hand.

There are two dials, one on either side of the instrument, to permit of view from both sides. The index hand shown travels forward and recedes, keeping pace with the momentary speed of the vehicle, while behind this index hand is another traveling with the first named so long as the speed continues to increase, but remains stationary when the machine slows up or stops for, say, three to five minutes, when it is released and flies back to the position then occupied by the first named index hand.

The device is intended as a speed meter for the convenience of the automobilist and also for indicating to the police or other outside parties the speed at which the vehicle is momentarily traveling. In connection with the latter use the inventor cherishes the fond hope that once the device is on the market city councils will make its use compulsory. He states that after adjustment it is positively accurate, which claim, we believe, would be difficult to substantiate in practice, since the jolting on rough roads would be bound to affect a centrifugal device supported upon the running gear without the interposition of springs. At high speed it would be impossible to read the indications of the instrument from outside the vehicle unless it be made unusually large. A further obstacle

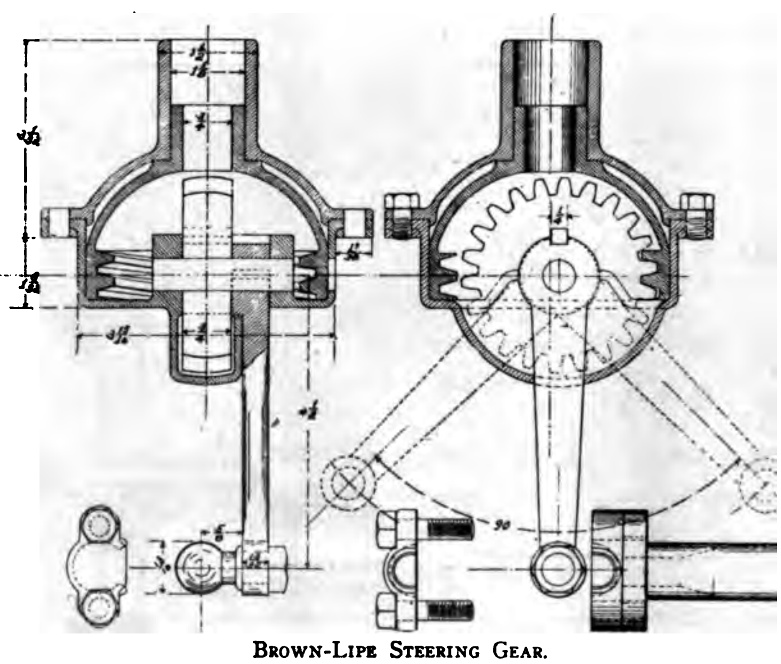


Hodgson's Speed Registe

to the realization of the inventor's that when the police take occasion automobilists for speeding, the usually so much above the legal there is absolutely no question having been beyond the limits by law.

The Brown-Lipe Steering

The Brown-Lipe Gear Com Syracuse, N. Y., are putting market a very practical appearin sible steering gear, made in two for runabouts and medium weight and the other for touring cars a vehicles. As the accompanying il shows, the device comprises a be metal piece at the lower end of ing post, with large internal thr the mouth of the bell. With th engage the teeth of a spiral gear upon a shaft located nearly at rig



Brown-Lipe Steering Gear.

:eering post centre line. To this ıft is fastened a lever arm, from nk connection is made to the knuckles. The entire mechanism ed. The gear is self locking in ion. A three-quarter turn of the ıeel changes the steering wheels straight ahead to the hard over and one and a half turns of the :el move the lever arm through ·ange of 90 degrees. The device d to be dust and oil proof and to y attachable to any style of ve- t is provided with a ball and ›int for connection to the steer- kles.

:me Safety Steam Throttle Valve.

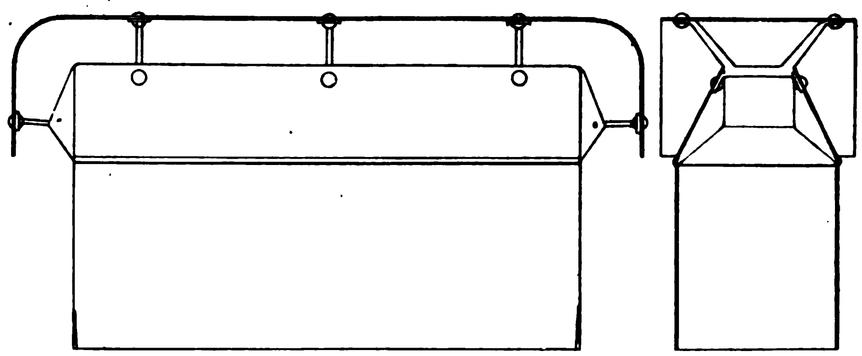
:tle valve for steam carriages pos- ›me features of novelty is placed market by the Nolte Brass Com- Springfield, Ohio. Referring to ration, the valve is provided with ats, one seat being conical and one l. The steam passes from the ırough a cylindrical stem bored · holes, through which the steam :d at the lower seat, thus insuring supply; it then passes around the ugh the upper seat to the engine. : carriage is in use the upper seat opening at all times, thus causing : wear on the upper or closing e regulating is all done at the t, through the holes in the cylin- m.

ıimed that should any part of the rating mechanism break the valve matically close immediately; yet the valve will remain in any po- which it is set.

lve is made of bronze steam is provided with a large packing packing being compressed with a l the nut locked. The valve may ed either in a horizontal or ver- tion; it can be applied to any icle, being made in two sizes, for ınd three-quarter inch pipe con- A boss on the side of the valve nits of attaching a lubricator to l the valves are said to be tested unds pressure.

tandard" Vacuum Smoke Cap.

ıtrate herewith a device designed t back firing on steam carriages, by the Standard Automobile ompany, of 1112 Betz Building, hia. The cap consists of a rec-



THE STANDARD VACUUM SMOKE CAP.

tangular sheet iron box, open on top and below. The upper parts of the lateral walls are inclined toward each other, reducing the top opening, and at some distance above this opening is arranged a flat iron sheet, somewhat wider than the box, with its two ends turned down, supported from the box by five cast brackets. The box is slit at the edges for some distance from below to allow of a ready attachment to the regular steam carriage chimneys.

Census Reports on Automobile Manufacture in 1900.

The Census Bureau at Washington in this year's report on the subject of the manufacture of locomotives deals for the first time with the subject of motor vehicles in a special chapter. The term motor vehicles includes, the report states, all classes of self propelled carriages, wagons or trucks used for the conveyance of passengers or the transportation of merchandise. Of such vehicles, it seems, 4,192 were constructed in the United States during the census year 1900, and their aggregate value, as reported by 109 manufacturers, was $4,899,443, an average of $1,168 to a vehicle. The following is a division by States:

	Manufacturers.	Number.	Value.
California	4	6	$9,350
Connecticut	4	911	1,890,592
Illinois	6	671	758,777
Indiana	4	55	61,915
Maine	3	13	13,100
Maryland	3	25	55,500
Massachusetts	17	1,198	789,892
Missouri	3	28	29,600
New Jersey	8	248	452,655
New York	21	624	471,547
Ohio	8	188	240,000
Pennsylvania	13	74	73,450
Wisconsin	6	124	30,900
Others	9	27	12,565
Total	109	4,192	$4,899,443

The report further states that "as but few of the establishments manufacturing motor vehicles were devoted exclusively to this work, and as, in many cases, their operations covered only a portion of the census year, or were not continuous during that period, it is impracticable to give any statistics relating to the industry beyond the quantity and value of the product.

"Bicycle factories figure largely in the industry, and a considerable number of automobiles was constructed by carriage builders. A great many machine shops each built from one to half a dozen motor vehicles, mostly, however, in an experimental way. The total value of the electric vehicles turned out in 1900 exceeded the combined total values of the other two powers, was three times as great as the total value of the gasoline output and almost twice that of the steam vehicles, although the number of steam vehicles manufactured was greater. There were 1,575 electric vehicles in all, worth $2,873,464; 1,681 steam vehicles, at $1,147,927; and 936 gasoline vehicles, at $878,052."

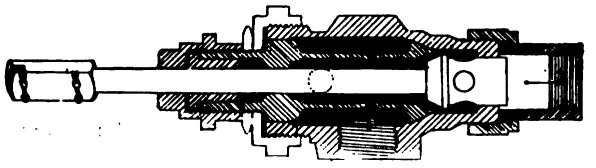
Race Meet on the Pacific Coast.

The Automobile Club of California is organizing a race meet to be held on one of the local tracks some time this fall.

Harry Turner, of Los Angeles, claims to have the fastest automobile on the Pacific Coast, and Dr. Scheffman, of the same city, also has a big racing machine.

The Austin Gasoline Automobiles to Be Made at Grand Rapids.

A gasoline automobile designed by Walter S. Austin is to be manufactured in a plant now erecting at Grand Rapids, Mich. The machine is said to be designed on French lines, with a 16 horse power engine in front and a transmission gear giving three forward speeds and one reverse. A maximum speed of over 40 miles an hour is figured on and the weight complete will be about 1,500 to 1,600 pounds. For the present the machines will be manufactured and put on the market by Austin & Son under the style of the Austin Automobile Company, but efforts will probably be made to interest capital and form a stock company.



SECTIONAL VIEW OF THE ACME STEAM THROTTLE VALVE.

MINOR MENTION

An auto livery has been established at Minneapolis.

An automobile club is being talked of at Chattanooga, Tenn.

The Auto Vehicle Company, Los Angeles, Cal., are testing their first machine.

S. A. Milner, Hartford, Conn., has taken the agency for the Prescott steam carriages.

Hunting by automobile is the latest development of the sport in Southern California.

Automobile races are to be a feature of the Kansas State Exposition now being held at Topeka.

The Automobile Club of Bordeaux, France, made a club run into the Pyrenees and Spain recently.

The I. A. Weston Company, Syracuse, N. Y., are about to place an auto artillery wheel on the market.

H. H. Buffum, Abingdon, Mass., is preparing to turn out fifty of his gasoline touring cars next year.

The Winton Company, Cleveland, Ohio, will erect a large building for a show room on Huron street, same city.

The Spaulding Automobile and Manufacturing Company, Buffalo, N. Y., are getting out a touring car for 1903.

The Columbus Buggy Company, Columbus, Ohio, are preparing to place on the market a line of electric vehicles.

George H. Thacher, of the Thacher Car Wheel Works, Albany, N. Y., is building an automobile after his own ideas.

The Union Automobile Company, Union City, Ind., are just finishing a new model, one of the features of which is the ignition.

The Autocar Company, Ardmore, Pa., have orders for 500 cars on hand, and are looking for fifty more suitable mechanics.

George Trapp, Whitestone, L. I., announces that he will introduce two electric stages between that place and Long Island City.

Dr. A. W. Mierley, Davenport, Ia., has designed a gasoline automobile, and is endeavoring to organize a company to manufacture it.

W. J. Bush and W. E. Hibbard, who are starting an automobile factory at Fond du Lac, Wis., state that they expect to begin operations with fifty men.

The Standard Automobile Company, West Thirty-eighth street, New York city, have taken the agency for the well known Decauville automobiles.

The Olds Motor Works, Detroit, Mich., deny that they intend to turn out a double cylinder machine at $800 for 1903, as was reported in our last issue.

The Daimler Manufacturing Company, Steinway, L. I., has purchased a large tract of land at Bergen Point, N. J., on Newark Bay, and will erect a large factory for the accommodation of its growing business.

Edward F. Lavigne, of New Haven, Conn., claims to have invented a new form of gear transmission for automobiles.

The New England Electric Vehicle Transportation Company announces payment of a second dividend in dissolution of $1 a share on September 15.

The National Vehicle Company, Indianapolis, Ind., have disposed of their carriage department and will confine themselves to the production of automobiles.

A. Lindsay Rich, Fred L. Owen and Waldo R. Bartlett have incorporated the Rhode Island Automobile Company, Providence, R. I., with a capital stock of $100,000.

C. M. Van Stine and H. W. Norcott have opened a storage and repair station in Bridgeport, Conn., with office at 615 State street and repair factory at Oak and George streets.

The Upton Machine Company, Beverly, Mass., have moved into a new plant near the Beverly railroad station, where they have excellent wharf privileges. They will henceforth manufacture complete automobiles.

The Motor Car Company, 5920 Penn avenue, Pittsburg, Pa., have in hand a new gasoline automobile which they expect to finish soon. They are erecting a large plant. J. F. Trembly is manager and R. E. Twyford engineer.

The Fournier-Searchmont Automobile Company have decided to keep their business offices in Philadelphia instead of removing them to their new factory, and are now installed in Rooms 503 to 507 North American Building.

New York newspapers the past week reported the project of the Long Island auto speedway to be actually on foot. W. K. Vanderbilt, Jr., the automaniac, and others of the same class are said to be interested.

Three new automobile companies are said to be on the tapis at Grand Rapids, Mich., one being the manufacture of an auto motor designed by Clark Sintz, the veteran manufacturer of gas engines, a new automobile of whose design was recently tested by a run to Detroit and back. It is said that a $500,000 company is to be organized.

The Magnolia Automobile Company has been organized at Riverside, Cal., by A. W. Miller, president, and W. L. Moreland, mechanical superintendent. A factory will be built and gasoline automobiles of several styles, including 15 horse power touring cars, will be manufactured. Mr. Moreland was formerly in the employ of some of the leading Eastern manufacturers.

The trustee in the bankruptcy proceedings of the Steam Vehicle Company, Reading, Pa., has filed his first account, and the same will be called for passing upon and declaration of dividend on September 20, 1902, at 10 o'clock, at the office of Christian H. Ruhl, No. 534 Washington street, Reading, Pa. The same day has been fixed for an examination of George Alfred Lamb, treasurer of the bankrupt company.

The Clifford automobile route is reported to have been established between Pearce and Cochise, Arizona, and to be running on schedule time. The speed is 17 miles an hour and four passengers and baggage are carried.

Schuyler Zent, of Marion, Ohio, is about to place on the market a gasoline machine which is said to have made a very creditable showing at the endurance test held in Kansas City recently. The Ferguson Implement Company, of that city, has taken the agency for the machine. Mr. Zent will form a company at Marion.

A. P. Heyer, proprietor of an automobile station at Bloomfield, N. J., has a rather novel plan for aiding motorists who meet with accidents. He keeps an emergency bicycle, fitted with a 2 gallon gasoline tank, a stock of lubricating oil, jacks, tools and repair materials, which can be sent immediately to any disabled car. The operator has only to telephone to the station and a mechanic is sent on the repair bicycle.

Alfred Austell, the Yale freshman who left New Haven the latter part of July for Atlanta, Ga., in an automobile, reached Atlanta on the evening of September 8. The machine employed was a Winton touring car, and the young tourist had with him a chauffeur, Charles Swenson, a Swede. Only two breakdowns were reported, a burned out induction coil at Staunton, Va., and a broken brake just before Atlanta was reached. No attempt at record breaking was made.

The Toledo Automobile Club.

The Toledo Automobile Club was organized September 14 at a meeting held at the Boody House. A large number of motor enthusiasts have for some time past had the idea of forming such a club and the meeting was the direct result. The attendance was not as large as desired, but those who responded to the call went into it with spirit. Dr. Charles P. Wagar was elected chairman and H. C. Tillotson secretary. A committee appointed to draw up a constitution and bylaws consisted of Grant Williams, George D. Palmer, Jr., and F. H. Dodge. Another meeting was called for Saturday, September 27. Those present included the officers named above and J. N. Bick, George R. Ford, C. Daudt, Louis A. Leffring, F. J. Landgraf, George K. Detwiler, W. N. Braun, V. M. Falardeau, C. B. Spitzer, D. W. Murphy, W. H. Potter, H. R. Felker, Ezra E. Kirk, H. H. Brand, M. G. Bloch, Guy R. Ford, Jerome H. Smith, M. A. Scott, J. J. La Salle, Normand De Veaux, L. E. Beilstein, A. S. Raymond, G. A. Kennedy, George Troutt, L. Lichtie and two out of town visitors, Theodore C. Whitcomb, of Indianapolis, and Orlando Weber, of Milwaukee.

Legislative and Legal.

ıld S. Vanderbilt was fined $10 for ıl speeding at Oyster Bay, L. I., on ıber 8.

ı H. Darrin and Jacob L. Pelzer rrested and held in $300 bail each eged violations of the speed ordi- ɔn Central Park West, New York.

e Commissioner Fowle, of Detroit, declares his intention of curbing :orchers by increasing the force of policemen in plain clothes.

. Bourne, of Oakdale, L. I., was ar- and fined $25 for exceeding the imit while on the way to his home turday. Mr. Bourne pleaded guilty.

cil Bluffs, Ia., has recently passed ıile limit for automobiles, with the ıdded provision that an auto driver top his machine when an approach- ·se shows signs of fright.

iouthampton, N. Y., September 10, ıe against Gerald May for alleged ɑ of the Cocks law was dismissed ground that the State had failed to hat the village was incorporated.

supervisors of Lower Gwynedd iip, Pa., have posted a 10 mile no- d the borough of Callingdale, Pa., cen the same action, the fine being · the first offense and $25 for each ıent offense.

ıtor A. H. Leslie, Pittsburg, Pa., has ıd a city ordinance requiring drivers ımobiles to be licensed by a special ɔf examiners acting with the public committee of the common council. cal press is in favor of the propo-

stop watch was brought into requisi- ıt Friday by the police at Manches- ss., with the result that three young bilists were gathered in for exces- eding. In court at Salem they were ı25 each and admonished by the

city council of Racine, Wis., has an ordinance reducing the speed of biles in the city to 6 miles an hour. tated in the press that owners of biles in the city will publicly defy linance and give the police as much as they can in their attempts to it.

case of August Dietz, chauffeur of Guthrie, of Lattingtown, L. I., who rested on Long Island, August 30, lating the Cocks bill, came to trial 6th. Mr. Guthrie, who acted as for his chauffeur, contended that it possible for his machine to run at han 20 miles an hour, as it was to only 12 miles an hour. The court ietz $20, and Guthrie gave notice of al.

Board of Freeholders of Newark, whose first ordinance to regulate affic was vetoed by the mayor be- t was too severe, have so amended automobiles will be allowed to run iles an hour in the country districts ex County, i. e., anywhere west of the summit of the Orange Mountains. East of this point speed is limited to 8 miles an hour, while in rounding corners a limit of 4 miles an hour is fixed.

The solicitor of Middlesex County (N. J.) states that the automobile curfew resolution introduced by one of the aldermen of Trenton recently is manifestly unconstitutional.

Charles A. Lee, Oneida, N. Y., is being sued for $6,000 damages by B. F. Chaplain, of Blackmans Corners, N. Y., who alleges that he was injured to that extent while endeavoring to restrain a horse which was frightened by the former's automobile.

The Commissioners of the District of Columbia, Washington, D. C., have denied the application of the local committee of arrangements for the Grand Army Encampment to hold an automobile race on one of the principal avenues during the celebration, on the ground that it would be a public danger.

The County Board of Freeholders, of Atlantic County, New Jersey, has passed an ordinance limiting the speed of automobiles to 10 miles an hour. This regulation, which goes into effect September 20, includes the speedway down to Atlantic City, on which automaniacs have been wont to try for records. Special officers will be detailed to patrol the road, and a fine of $25 will be imposed for each violation. Automobiles are required to come to a full stop when approaching teams show fright.

Automobile Accidents.

The rear axle of an electric automobile broke in Jersey City last week while it was crossing the car tracks. No one was hurt.

At Huntington, W. Va., a boy thirteen years old was run over by an automobile September 4 and severely injured, probably fatally.

A fire said to be of unknown origin consumed the steam machine of Dr. Kirby, Grand Island, Neb., recently. The doctor had just housed his machine in his barn for the night.

E. W. Benedict and two companions, Topeka, Kan., while returning from an attempt to lower a cross country record, lost control of the machine, were ditched and seriously injured.

Robin Damon's automobile met with a mishap at Salem, Mass., recently. The wheels slid in the wet car track causing a collision with a trolley car. The machine was badly damaged, but no one was hurt.

As L. W. Baldwin was spinning along Broadway, Far Rockaway, N. Y., recently the machine stopped so suddenly as to throw him out and seriously cut his face. The chain had broken and become lodged in the machinery.

Dr. Charles M. McLean and John Kilmar were seriously injured at Des Moines, Ia., on September 2 when the automobile in which they were driving overturned. The cause of the overturning was that a big dog ran suddenly in front of the machine.

At Reading, Pa., the automobile of Dr. Bropst was struck by a trolley car and considerably damaged on September 3.

By a failure of the steering apparatus or the operator thereof, three persons were injured in turning a corner at New Haven, Conn., recently.

At Oakland, Cal., last Friday, while riding with her nephew in an automobile, which became unmanageable, the wife of United States Senator W. M. Stewart, of Nevada, was thrown out violently against the curb and killed.

The steam machine built by Harry Sharpe, of Omaha, Neb., is reported to have been destroyed by fire while standing at the curb in that city recently. It was unoccupied at the time, and no cause is assigned by the press for the accident.

A heavy delivery automobile broke an axle in Pittsburg, Pa., September 2, and delayed traffic for some time. While the vehicle was being driven up Wood street the wheels lurched against a rail, which caused the axle to break.

Judge Dixon's Righteous Charge.

In charging the Bergen County (N. J.) grand jury recently in the case of the People vs. Blum, whose automobile scared a horse attached to a lawn mower in front of Mrs. Poor's house at Hackettstown, and thereby caused the death of John Henches, an employee of hers, Judge Dixon declared that it was matter of common knowledge that automobilists were abusing the common rights of the highway, that anyone driving an automobile at the speed alleged in this case was guilty of a public nuisance, and if it could be shown that the excessive speed was the cause of death the parties guilty should be charged with manslaughter.

"We all have a right," he concluded, "to the highways in our vehicles and on foot just the same as we did before these machines came upon the roads. It is not a question of municipal ordinance; it is the law of the State. It does not depend on a statute; it is the common law which we inherit from our ancestors. Everybody who so conducts himself as to endanger persons who are in the exercise of the common right is guilty of creating a common nuisance and should be indicted for the same."

Trade Literature Received.

Automobile Parts.—The Auto Supply Company, 310 Mott avenue, New York.

The Acme Safety Steam Throttle Valve. —Nolte Brass Company, of Springfield, Ohio.

Ball Bearing Tubular Rear Axles for Automobiles.—Centaur Motor Vehicle Company, of 59 Franklin street, Buffalo, N. Y.

Gasoline Carriage Parts.—A. L. Dyke, of St. Louis, Mo.

...OUR... FOREIGN EXCHANGES

The Reliability Trials of the A. C. G. B. and I.

The 650 mile reliability trials of the A. C. G. B. and I. began on Monday, September 1, to be continued for the entire week. On the Saturday before the actual reliability trials began all competing vehicles were subjected to brake tests, both up and down a hill of about 13 per cent. The cars were first tested on the descending grade, employing first both brakes, then the foot brake and side brakes separately, to show whether or not they would hold the cars stationary on that grade. Messrs. Holder and Johnson marshalled the approach of the vehicles to the testing point. The cars were driven slowly on to the grade, and both brakes applied upon Mr. Edge, who acted as judge, raising his hand. Then the power of first the foot brake and then the side brake was tested, with the clutch out, to ascertain whether each would independently retain the car on the grade. The results were generally quite satisfactory, but in the large majority of cases the foot brakes proved to be more powerful than the side brakes. In the holding backward trials with both brakes there were practically no failures. The numerous instances in which the side brakes failed to hold on the downhill test, while the foot brakes held, should not cause it to be presumed that the side brakes were accordingly inefficient. With the majority the failure was due to oil on the drums and general unpreparedness for severe official tests. The brakes are written down as not holding if the car showed the slightest suspicion of moving, so that failure marked here does not presume the brake unsafe or unreliable for general all round road use.

ROUTE OF THE 650 MILE RELIABILITY RUN.

As is shown by the map of the various routes of the trials, reproduced herewith, the runs each day began at the Crystal Palace, Sydenham, some distance to the south of London.

MONDAY'S RUN—TO FOLKSTONE AND BACK.

On Monday morning early there was a drizzling rain, and the weather prospects were decidedly unfavorable. As early as 6:30 there was considerable animation in the garage of the Crystal Palace, and shortly after the vehicles began to line up, according to their numbers, large placards on the fence designating the various stands. Although ninety-two vehicles had been entered for the trials, only seventy participated in this day's run, some arriving at the starting point later than the specified hour, and being disqualified for this reason, while others failed to put in an appearance.

The signal to start was given to the first vehicle at 7:10 and to the last at 7:44. It was noticed that a number of vehicles entered, with which exceptionally long "private" endurance tests were made recently for advertising purposes, failed to put in an appearance. The order of departure was determined by lot.

The early hour and discouraging weather precluded anything like a spectacle of departure, and as the cars were dispatched at regular intervals of time, after each driver

LINED UP BEFORE THE START, THE GARDNER-SERPOLLET LEADING THE PROCESSION.

:ived some solemn caution from y Johnson, there was no sort of n for the benefit of the few early 10 gathered along the outer su- oads.

of the vehicles which were dis- for one reason or another accom- he procession, leaving some time last competitor had been started. in the country was rather monoto- cept that horse owners at various ok advantage of the occasion for ing their animals to the new At one place even the fire de- came out to break in their horses ito.

ad surface was rather favorable to from the Crystal Palace through m, Bromley and Chiselhurst , but after Foot's Cray the road id to be excellent. At Chisel- mmon there is a rather difficult 10 horse power Ariel went up this the observer and passengers walk- cause being explained to be that car had stopped directly in front riel on the worst portion of the the result that the driver stopped ne, and, owing to the very heavy of the road the car could not be notion again without the passen- tting out. Near this place a 11 wer Napier was also stalled, owing retor troubles it is thought. Near ham an Oldsmobile was so un- as to break a bracket on the en- nk chamber, which prevented its ng on the course, and it was re- o Harrietsham, being pushed by

efore reaching Maidstone, owing mewhat ill judged attempt of a car mother, the 10 horse power M. M. ed with a farmer's cart. The cart ed over, without being greatly , and the honorary observer was nto the mud on his back, more by en application of the brakes than rce of the collision. The car was htly injured. Between Maidstone tford Baron Rothschild's Pascal d a horse in a trotting buggy. nal took the hedge like a steeple- ulling buggy and driver with him, ed by breaking away from the Happily there was no damage to nb.

ules of the contest were that no over 12 miles an hour would ized. Speeds of 14 or 15 miles an re permitted, but above this dis- ion threatened. The minimum the various control stations were ad considerable loafing had to be to at various places to avoid arriv- le of minimum time.

before the first car was expected rested group had assembled to e arrivals on the terrace at the It was not long before S. F. rned up on his Napier and re- he successful progress of the day and the greasy condition of the roads. After a long gap the first to arrive was the 10 horse power Peugeot, followed by one of the Gardner-Serpollets. A few moments later the two Humber bicycles came in closely, followed by Mr. Instone on his 22 horse power Daimler, a 15 horse power Germain, Mr. Critchley on the 12 horse power Brush, one of the White steamers and the Wilson and Pilcher car. From that point the competing vehicles followed one another closely, and the spectators, whose numbers by this time had greatly increased, had an excellent opportunity of seeing the ease with which cars can be manœuvred in a limited space. As darkness came on the cars were still continuing to arrive, but even in the gloom and among the jostling sightseers no difficulty was experienced in getting the cars into their appointed places. Much interest was taken by the general public in the "washing down" process, for which two hours only were allowed, divided between the night and morning if desired, and the celerity with which the men got to work caused approving remarks to be made on all sides. Before 9 o'clock all but three of the seventy cars which started had returned.

On the return journey, a few miles on the London side of Maidstone, the 12 horse power Gladiator met with a misfortune—a pin securing the spur wheel on the half speed shaft having dropped out, which, of course, brought the engine to a halt at once; the car was wheeled into a convenient side lane, the gear case removed and the trouble remedied, the car ultimately arriving safely at the Crystal Palace at 8:50. Up to the time the accident occurred the car had been running faultlessly and had not lost a single mark. The driving of the Frenchman Garcet, who was in charge of the car, was admirably self controlled and reliable. This was well shown on Chiselhurst Hill, a particularly steep gradient on the outward journey. A crowd of vehicles were ascending the hill and some of them stuck. The Century voiturette stuck, commenced to run backward, and not only stopped the advance of the Gladiator, but ran back into it.

TUESDAY—TO EASTBOURNE AND BACK.

Of the seventy vehicles which started in the first day's run sixty-seven reported for the start the next morning, those missing being a Georges Richard, a Humber and an Oldsmobile. The weather was good and roads had dried up much, since the rain had ceased at noon on Monday.

The route, both on the outward and homeward journeys, was a far severer test than that of Monday, a large amount of climbing having to be done. The order of starting was different from that on the first day, each day's start being determined separately by lot. A 20 horse power Wolseley was the first to get the signal to start, a few minutes after 7, and it was followed by a New Orleans, a Daimler and a Peugeot in the order mentioned.

At Polegate, 5 miles from Eastbourne, a railroad crossing with the gates closed stopped a good many cars. Once free of it the run into Eastbourne was straightforward, save where the road in process of mending gave tires a rather bad time. Several privately owned cars came out to greet the contestants as they approached the "Garden City." Eastbourne was full of visitors, who had laid themselves out to view the spectacle of the cars, and the imposing procession was the cynosure of all eyes as it passed along the front on the way to its objective, the Town Hall, which was reached by most cars between a quarter to 12 and a quarter past.

The return journey was begun at 12:30, and by 1 o'clock practically all the vehicles had got away. Between Edenbridge and Westerham the people had turned out in a body to see the procession, and the school sessions were interrupted, teachers and scholars lining the road.

The weather continued to be good until Westerham Hill, one of the most trying parts of that day's itinerary, was reached. There it began to rain, and at the time the first vehicles arrived at the finish the rainfall had become very heavy. The wet made the surface of Westerham Hill very hard going. Most of the cars made the ascent between 3:15 and 4 o'clock. The steepest part of this grade is 12.8 per cent. Following are some notes by a representative of the *Automotor Journal* on the behavior of the various cars on this hill:

The 16 horse power Napier with Midgley tires for trial was the first to run up and had no difficulty. Next came another tire contest car, a 10 horse power Panhard, fitted with Dunlops. It is not easy to say whether it actually stopped, but it went dead slow and the occupants of the tonneau, not waiting to open the door, rolled over the sides in a panic and pushed strenuously.

The 5 horse power Century tandem which on the road was doing very well went up empty, both observer and driver footing it, the driver steering from the road. Zigzagging was had recourse to by the 10 horse power Georges Richard, which did not avoid sticking for a time and even backing. The 10 horse power Mors achieved the hill all right.

No stop was made by either of the Daimlers; with these engines, climbing Westerham Hill is a task easy to accomplish. Yates, on one of the Humber cycles, was aground the first time in the trial; he had a bad slip, and pushed to the top. The sister bike ascended well, as did also the 10 horse power Wolseley (Dunlops) and the 10 horse power M. M. C. The Ormonde cyclist walked up. Both the White steam carriages got up without a stop, one pumping hard; and, of course, the 20 horse power Wolseley succeeded. Not so the Baby Peugeot, which stuck ir-

retrievably, and was pushed ingloriously. The 11 horse power Napier (Dunlops) went up with only the driver aboard. Smoking badly, by reason of its lubricating oil, the 10 horse power Peugeot saved itself "so as by fire."

With an effort a Locomobile scaled the ascent. Jarrott, owing to slipping his gear, very nearly stopped with his 15 horse power Panhard; otherwise, of course, this car is equal to harder tasks than this. Both the 14 horse power and the 9 horse power New Orleans had no difficulty; two of the passengers in the lower powered car had got out, however. One passenger also got out of the 12 horse power Gladiator and pushed. Baron Rothschild glided gaily up in his 20 horse power Pascal, and the 15 horse power Germain did not halt; neither did the 10 horse power Brooke. Almost hidden by a swirl of smoke and steam the 6 horse power Gardner-Serpollet was just discoverable while it made the ascent. Three passengers got out of the 8 horse power De Dion at the bend, and two alighted from the 12 horse power Century, but this did not save it from sticking. The "stickit" cars included also the 16 horse power and the 22 horse power Clement, the 10 horse power Decauville, and the 4½ horse power Renault.

The first car home, a 16 horse power Napier, arrived at the Palace at 4:37, more than an hour earlier than the first car on Monday. The 10 horse power Panhard came next, and afterward followed the 5 horse power Century tandem, 10 horse power Mors, 12 horse power Belsize, 10 horse power Wolseley (with Dunlops), 20 horse power Wolseley, 22 horse power Daimler, 10 horse power Georges Richard, 12 horse power Daimler, and 6 horse power White steam carriage. The maximum time allowed for the day's run was 13 hours 54 minutes.

By 5:30 fifty cars had returned, and by 6:46 sixty had been consigned to the washers. It was at this time that Mr. Critchley arrived on the 12 horse power Brush, having been delayed by putting in a new coil. The 10 horse power Clement, too, had been delayed, having had to fit a new tire to a back wheel. The 6 horse power Gardner-Serpollet had also fallen on tire hindrances, having been compelled to make three separate stops owing to tires being down.

Sixty-four of the sixty-seven starters had arrived at the finish by 7:30. Among the three missing vehicles was that of the club's secretary, who was compelled to abandon owing to the breaking of his differential gear. Arnott, riding a Werner motor bicycle, came to grief through a dog crossing his path, in the morning. He had a rather bad fall. This left three motor bicycles in the contest, two Humbers and an Ormonde.

The day's run was 120 miles.

WEDNESDAY—TO WORTHING AND BACK.

There had been a heavy rain during the early morning hours and the roads were extremely slippery. The distance to be covered was again 120 miles.

Sixty-two vehicles started. A Georges Richard, against which a protest had been lodged at the beginning was now withdrawn. S. F. Edge, the honorary marshal, led the procession in his 16 horse power Napier out to Carshalton, and on to the Epsom road at Cheam, where the vehicles were reported in their proper order, and at proper intervals. The Dorking road was in excellent condition, as was the road right on to Worthing. The day was now glorious, with a bright sun and a cool fresh breeze. But few breakdowns, and those of the smallest, took place during the day, the majority being slight tire repairs. The Sussex police were posted about 5 miles outside Worthing, and took the names of drivers who exceeded 18 miles per hour, and they were again found in ambush around Reigate. Most of the competitors were warned of the traps in time, but the officiousness of the police was absolutely unnecessary, as the cars were driven throughout at a reasonable and perfectly safe speed. By 7 o'clock all the vehicles were back in the Crystal Palace garage, clean and fit for exhibition, so that the evening attendants at the Palace were able to enjoy a fine view of the much traveled vehicles. All of the six American steam carriages entered arrived on Wednesday evening within control time (as well as in the two previous stages.)

(To be continued.)

The Crystal Palace Motor Bicycle Races.

Under the auspices of the A. C. G. B. and I. a series of motor bicycle races were held on the Crystal Palace track, Sydenham, on August 28.

The first event was a one hour scratch race open to any motor cycles for the *Autocar* challenge cup, won last year by Mr. C. Jarrott, who then traveled 36 miles 798 yards in the hour on a 8 horse power De Dion motor tricycle. Twelve riders had been selected by the committee to contest the event, and six others were held in reserve in the case of absentees. Curiously enough, the winner proved to be a reserve man, and the only other competitor who finished was also not of the original dozen. A good start was made, but some of the competitors dropped out early. Tessier's motor constantly misfired, and he soon gave up, as did Chase, Wade and E. T. Arnott. A loose handlebar troubled Jarrott, who left the track, shortly after to resume and then to give up ere the half hour had been reached. At the end of thirty minutes J. Van Hooydonk had covered 21 miles, being a lap ahead of E. H. Arnott, who was doing well on his Werner. At the end of the three-quarters of the hour Martin gave up after traveling 32 miles, and Hooydonk increased his lead, while Arnott and Parry struggled in grand style. Unfortunately, in getting round the bank the latter could not avoid p
Arnott, who came on to the grass,
he had a nasty fall. In addition t
severely shaken he was badly cut ab
face; but with characteristic pluc
again during the afternoon. Ho
completed 4 miles 290 yards in the
a record for the race and for the F
Arnott being placed second after t
qualification of Parry.

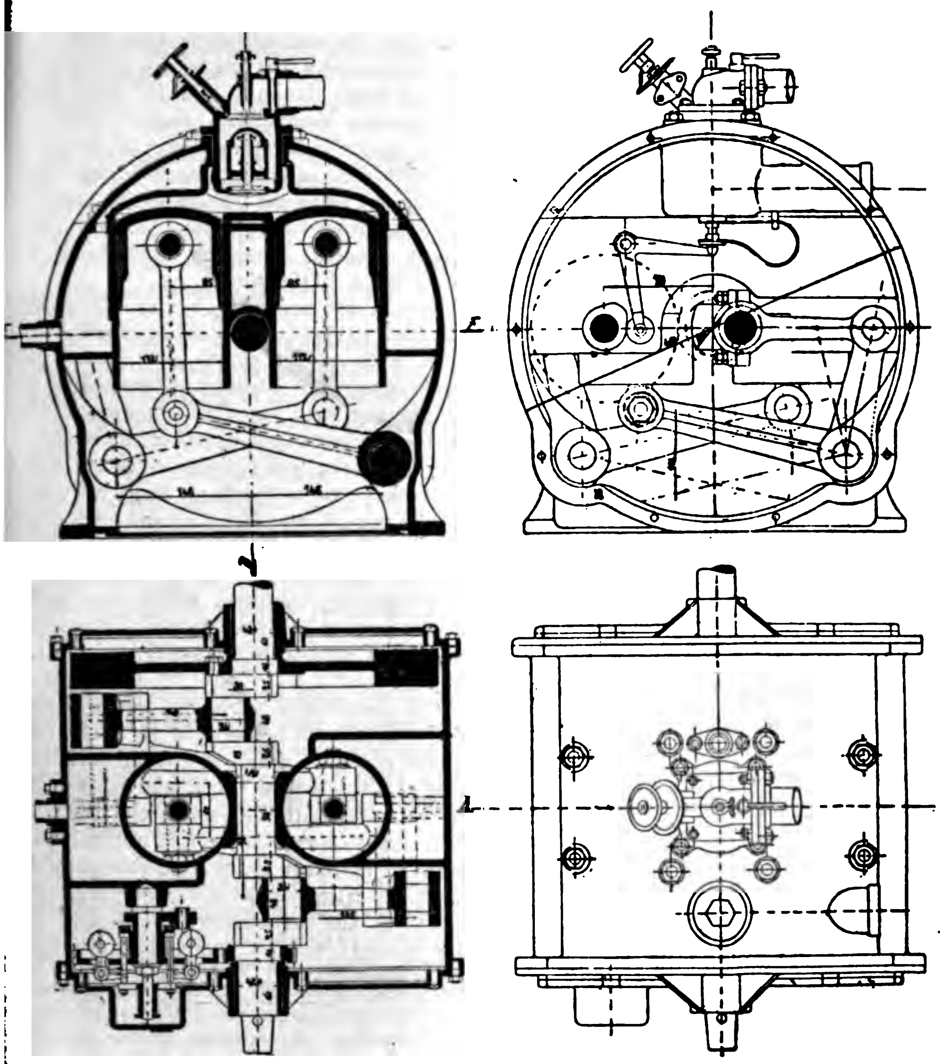
The *Motor Car Journal* Cup v
second trophy to be competed for, a
was run in five heats, thirty-two
having been received for the 5 mile
cap. The winner of each heat a
fastest loser were to compete in the

The winners of their respective
were: T. E. Coles (Brown, 1½
power), E. Perks (Singer, 2¾
power), S. C. Holloway (Miner
horse power), G. Van Hooydonk (I
2¼ horse power), F. R. Wade (D
horse power), and A. S. Sidwell
1¼ horse power).

The latter won his place in the f
reason of being the fastest loser.
thus be seen that a different mot
each event, the final producing a v
teresting contest, all wondering if
Hooydonk, whose riding was one
chief features of the meeting, woul
take the liberal start given to hi
petitors. In the end S. C. Hollowa
his time being 6m. 26 1-5s., slightly
than that which entitled him to run
final, F. R. Wade being second
Van Hooydonk riding strongly int
place. Last year Jarrott won i
10 4-5s., and in 1900 A. E. J. Steele i
2 2-5s.

No exciting finishes, such as enlive
last motor cycle meeting at Plymou
taken place, and the lap scorers par
ly looked weary and sad. But w
third event a change took place. C
ing the two heats into which the 1
handicap for the *Automotor's* challen
had been divided resulted in a larg
ber—sixteen in all—facing the
More lap scorers were requisitione
as the first half dozen riders r
the bank to the right of the
keepers interest revived. There was
thing that fired the nerves to see a
of motor cycles rushing round at
neck speed. Every minute the light
ened and the pace quickened. The
looked mere specks at the further
the course as they traveled at a
pace.

Happily no mishap occurred, a
the competitors emerged safe and
While the race was in progress it w
possible to judge of the likely v
since some competitors were conce
much as 14 laps' start, which meant
half the distance, the track me
three laps to the mile. It was,
the "limit" man that won the handi
C. Holloway, again, with a start of 1
490 yards. He succeeds Jarrott
tenure of the cup, Jarrott not turni



THE DUERR GASOLINE MOTOR.

for this race. Van Hooydonk's start was only 7 laps 270 yards, yet on the Phœnix contrived to finish third. Second honors went to J. E. Ridout, on a 2 horse power Minerva, with an allowance of 9 laps 220 yards. The time of the winner was 9 minutes 36 seconds.

The Dürr Gasoline Motor.

A gasoline motor of rather novel outside appearance, suggesting at first sight a blower or an enclosed electric motor, has recently been put upon the market in Germany by the Dürr Motoren Gesellschaft, of Berlin. The motor is built into a casing from which nothing projects except the shaft ends and the connections for fuel, air, water and the exhaust, even the flywheel being concealed within the casing.

The motor has two cylinders arranged side by side, but both have a common compression space and common valves and ignition apparatus; they are thus fired at the same time and the action is practically the same as that of a single cylinder engine. The crank shaft has double cranks, oppositely arranged, and the pistons act on these cranks through a pair of connection rods and a bell crank each, as clearly shown by the drawings. The connecting rods to the cranks are placed one on each side of the cylinders. The cam shaft is driven by spur gears and the exhaust cam is operated from the cam through the intermediary of a bell crank; to save space a flat spring is used to close the valve.

The carburetor or mixer is built together with the intake valve and a throttle in the intake pipe allows to regulate the motor speed at will. Moreover, a centrifugal governor cuts out explosions when the load is taken off.

The most advantageous features of the design seem to be the thorough protection of all the wearing parts and the low centre of gravity, which latter would seem to make the motor especially suitable for marine work.

Automobiles for the Congo Free State.

The British Foreign Office has learned from Boma that in the Congo Free State a road, 93 miles long, between Nsongololo and the River Kwango, has been completed, and is practicable for automobiles of all kinds. This road has a breadth of 12 metres (39 feet), of which 8 metres (26 feet) are available for vehicles. The surface is especially hard and durable, and there is no decline of more than 1 in 10, the hills being relatively few in number and short. Moreover, Captain Carton, the Belgian officer who has had the matter in hand, states that at the time of writing he had just completed the survey for a prolongation of the above road for more than 100 kilometres (62 miles), and he expresses the hope that this section will be ready for use within three or four months at the most.

This route, it is said, will not only give a means of rapid access into the interior of Africa, and be a powerful aid to the economic development of the country, but will not fail to attract adventurous tourists, as it passes through extremely picturesque and most varied scenery.

The Society of Motor Manufacturers and Traders.

News comes from London of the formation of a new trade organization with the above name. The society, according to the constitution, has been formed to encourage, develop and protect the motor and allied trades, and to watch over and protect the interests of the persons, firms and companies engaged therein, or in any auxiliary trade, and generally to do all such things as may be deemed conducive to the interests of the members of the society, but independently of any personal interests.

The following, from the constitution, will give an idea of how the organization intends to carry out its aims:

The society serves as a centre of information, and affords advice and assistance to its members generally in all matters affecting the motor trade, and provides convenient and well equipped premises for the use of its members.

It will be the policy of the society to endeavor to obtain special advantages for the body of its members and the automobile industry generally.

The society will give the legislature, public bodies, companies and others facilities for ascertaining the views of companies, firms and persons engaged in the motor trade.

The society intends to originate and promote improvements in the law, and to support or oppose alteration therein, as well as to protect its members against any aggression or otherwise affecting or menacing the true interests of the automobile industry.

The society intends to improve and elevate the technical and general knowledge of companies, firms and individuals engaged in the motor trade, and will promote just and honorable practice in the general conduct of business, and suppress malpractice.

The society will discuss and consider from time to time at special member nights questions affecting the automobile industry, as well as arrange for the delivery of lectures on subjects of general interest.

The society will publish and circulate from time to time, for the benefit of its

members, and give access to papers, periodicals, books, circulars and other literary matter appertaining to the motor industry and the objects of the society.

The society will arrange and promote the adoption of equitable forms of contracts and other documents used in the motor trade, and encourage the settlement of disputes by arbitration, and nominate arbitrators and umpires.

The society will encourage the discovery of, investigate, and make known the nature and merits of inventions and improvements bearing on automobilism for the benefit of its members.

The society will hold or assist in the holding and promoting of shows, exhibitions, competitions, races and trials connected with the motor trade generally, and give and contribute toward prizes, cups and other awards.

The show to be held at the Crystal Palace, London, January 30 to February 7, will be under the auspices of the society. To the members of this society a direct benefit will accrue, as the society will receive, under its agreement with the Crystal Palace Company, one-third of the net profits, which sum, instead of being acquired by a private promoter, will go to benefit the whole body of the members of the society.

Frederick R. Simms has been elected president, J. E. Thornycroft and S. F. Edge are vice presidents, and H. Belcher and T. F. Woodfine honorary treasurer and secretary respectively. Members of the following firms constitute the council: Wolseley Tool and Motor Car Company, Ltd.; Humber, Ltd.; George F. Milnes & Co., Ltd.; Motor Manufacturing Company, Ltd.; British Electromobile Company, Ltd.; Brush Electrical Manufacturing Company, Ltd.; Motor Power Company, Ltd.; Farman Automobile Agency; British Power, Traction, &c., Company, Ltd.; Hewetson's, Ltd.; Daimler Motor Company, Ltd.; Panhard & Levassor; Lanchester Engine Company, Ltd.; Locomobile Company of Great Britain, Ltd.; De Dion Bouton, Ltd.; Hozier Engineering Company, Ltd.; City and Suburban Electric Carriage Company, Ltd.; F. King & Co. (the *Automotor*); Iliffe & Sons (the *Autocar*); Simms Manufacturing Company, Ltd.; Thornycroft Steam Wagon Company, Ltd.

Report on the British War Office's Motor Wagon Trials.

The War Office Committee on Motor Traction has just made its report on the trials which were held from December 4 to 19 last. Five competing vehicles were entered by four makers. The committee recommend that the first prize of £500 should be given to the Thornycroft Steam Wagon Company, Limited, of Chiswick, for one of the lorries shown by that firm, having steam for its motor power and using coke or oil fuel; the second prize of £250 to Messrs. Edwin Foden, Sons & Co., Limited, Sandbach, for a steam lorry using coal; and the third prize of £100 to the Straker Steam Vehicle Company, Limited, of Bristol, for a steam lorry using coke fuel. In accordance with the recommendation of the committee, the first and second prize winning vehicles have been purchased for army use.

The committee, which consisted of Lieut. Col. F. R. Emslie, R. A., president; Lieut. Col. H. C. L. Holden, R. A.; Lieut. Col. R. E. Crompton, E. E., R. E.; Capt. C. H. Nugent, R. E., and Col. C. H. Scott, the secretary being Capt. F. Lindsay Lloyd, R. E., reports that the trials have shown that these steam lorries are good and serviceable machines, suitable for present supply and likely to be of great advantage to the transport service in countries where fuel and water in sufficient quantity are available. The committee would, however, desire to call attention to the great possibilities for military purposes of the internal combustion lorry burning heavy oil, as shown by the small combustion of fuel and practical independence of water of the one which was tried. They strongly recommend that steps to develop such lorries be proceeded with.

Compared with horse draught, these trials have shown that self propelled lorries can transport 5 tons of stores at about 6 miles an hour over very considerable distances on hilly average English roads under winter conditions. The load transported by each single lorry (5 tons) if carried in horse wagons of service pattern would overload three G. S. wagons, requiring twelve draught horses beside riding horses, whose pace would not ordinarily exceed 3 miles an hour. Moreover, the marching of 197 miles in six consecutive days over hilly roads would not have been accomplished by horses even at that speed without the assistance of spare horses.

The committee are of opinion that it has been demonstrated that mechanical transport of this nature has many advantages, and that it is well worth a much more extended trial.

Regarding the type of lorry, the experience gained at these trials has caused the committee to somewhat modify their original views. On more than one occasion the disadvantage of the trailer in preventing the lorry from moving freely backwards when required was clearly noticeable. On the whole the committee consider that a lorry drawing a single wagon, while having the disadvantages accruing from the use of a trailer, does not obtain, owing to there being only one of these vehicles, the full advantages which should belong to the system, and they consider that for handy and rapid work of distribution among troops and near the front of an army a lorry without trailer is preferable. At the same time they consider that for the heavier work of moving stores in large quantities to the depots a powerful tractor, drawing a train of wagons behind it, will be found most suitable.

The committee, therefore, recommend that they be empowered to take steps to obtain for trial a lorry or lorries on the following lines: To carry 3 tons, driven by an internal combustion engine burning heavy oil only; weight as light as consistent with due adhesion; wheels large and broad, and fitted with a means for rapidly applying numerous "spuds" for use on boggy ground. Speed up to 8 miles an hour; large platform area.

Finally, the committee beg to call special attention to the demonstration afforded by these trials of the entire harmlessness to roads of vehicles considerably exceeding in weight and road speed the limits allowed by the present regulations on the subject, and also fitted with wheels to which road strips have been fixed, so long as these wheels are of large diameter and have tires of considerable width. It has now been proved that the existing regulations are unnecessarily restrictive, whilst they stand in the way of the development of a most important method of transport and branch of industry.

The committee strongly recommends that this matter be brought to the notice of the proper authorities, feeling confident that the removal of these restrictions will tend to assimilate the commercial and military types of vehicles, and is not only important, therefore, from a service point of view, but also will have a most beneficial effect on the manufacturing industries of the country and its commercial development generally.

According to statistics in the *Autocar* horse accidents in Great Britain from August 26 to August 30 inclusive resulted in five deaths and sixty-five cases of injury.

C. H. Wordingham, M. Inst. C. E., of Manchester, England, is inviting tenders on behalf of a public institution for an electrically propelled brougham and omnibus.

The subject of granting driving certificates by the A. C. G. B. I. to qualified drivers of motor vehicles is to be referred to a special committee to be appointed in October.

A concession has been granted for carrying the mails by motor car between Quito, Ecuador, and the terminus of the railway constructed 90 miles inland from Guayaquil.

In connection with the A. C. G. B. I. Reliability Trials, the Continental Caoutchouc and Gutta Percha Company offered a series of prizes for cars gaining gold medals in Section I and fitted with Clipper Continental tires. For Classes A, B, C, the prize was £10 in each case; Classes D and E, £15 each; Classes F and G, £20, and Classes H, J, K and L, £25. In

on a prize of £25 was offered to the driver of the vehicle whose car was with Clipper Continentals, and tires at the end of the trial showed east signs of wear, providing that car had been awarded a gold medal.

lives, manager of the Paris automoow, states that the foreign element e much better represented at the g show than at previous ones.

Touring Club, of France, offers a l of 20 francs to any person furnishidence leading to the arrest of parties maliciously throw nails and tacks on

London newspaper agency by emg a motor wagon was enabled on a Sunday to deliver 12 cwt. of newss in Brighton two and one-half earlier than would otherwise have possible.

parations are in progress to install c arc lamps in the Bois de Boulogne, opular automobiling and driving park utside Paris. At present there is no nation at all in the park, and yet they aris Ville Lumière.

a rural district council meeting in lnshire, England, a member declared no check on the speed of motorists ikely to be imposed by the County cil, for most of the councillors were elves owners of automobiles.

August 1 there were registered in the tment of Seine, comprising Paris ts suburbs, 3,807 automobiles, which les only such as are capable of a of over 30 kilometres an hour. The er of driving permits issued amounted 500.

pollet's latest racer, which competed kilometre trials at Deauville, is called n "the whale." It is similar in genppearance to the one with which he at Nice last spring, except that the s curved and run out to a point exthe same as the front.

vity is said to be the soul of wit, but evidently not considered an essential ccess by the "Société Anonyme les et d'Exploitation des Brevets A. in pour Machines Agricoles Autoes, Paris, France," a firm engaged in evelopment of motor propelled farm nery.

automobilist while touring in Ireland rer a chicken, and noticing the obpoverty of the owner thereof stopped imburse him. But when the latter ed the damage at 5 shillings, the obilist promptly remounted and drove The high valuation of the chicken not justify the conclusion that chickens are rare in Ireland; it is rather the rarity of touring automobilists in that country which determined the chicken raiser's estimate of his loss.

The British War Office has postponed its competition for tractors for military purposes from the spring of 1903 to October 1903. Intending competitors should apply October 1, 1902, for forms of entry to the secretary, Mechanical Transport Committee, Whitehall, S. W., London, England.

Mlle. Irene, a Parisian actress, while touring in her automobile at Luxeuil, received a call for a pressing engagement in Paris and went by train, leaving her machine to her chauffeur, who was to bring it back to Paris. Mlle. Irene has heard nothing of either the chauffeur or the machine since.

The Deauville races were participated in by several ladies. Mme. Jolivet rode a motor bicycle and covered the kilometer in 58 seconds. Mme. Bob Walter, a former music hall artist and now automobile agent, drove a 16 horse power vehicle and covered the kilometer in 40 seconds, or at the rate of nearly 60 miles an hour.

The Neue Automobil Gesellschaft, of Berlin, Germany, a sub company of the Allgemeine Electrizitaetsgesellschaft, also of Berlin, has acquired the rights to manufacture the Kühlstein gasoline vehicles recently described in THE HORSELESS AGE. The A. E. G. has purchased the automobile department of the Kuhlstein Company, which is a carriage manufacturing concern.

It appears that all the large national automobile clubs grant visiting members of recognized clubs the privileges of honorary membership for a short period, except the Automobile Club of France. Owing to the law which prohibits the introduction of honorary members into a club in which playing cards for money is allowed, members of foreign automobile clubs cannot make use of the apartments of the Automobile Club de France.

Mayors of various French towns have complained to the Government that under the new law they have no power to prevent excessive speeding. The Government has replied that the new law is not intended to prevent the provincial mayors from making necessary local restrictions for automobiles, but at the same time the Government warns the mayors that should they exceed their powers the commissioner of police will intervene in support of motorists.

At the Russian army manœuvres which were to begin September 11 (August 29) at Koursk automobiles were to be officially adopted for the first time. Four light carriages were to be employed by the staff officers and four large vehicles for transport, all being of the gasoline type.

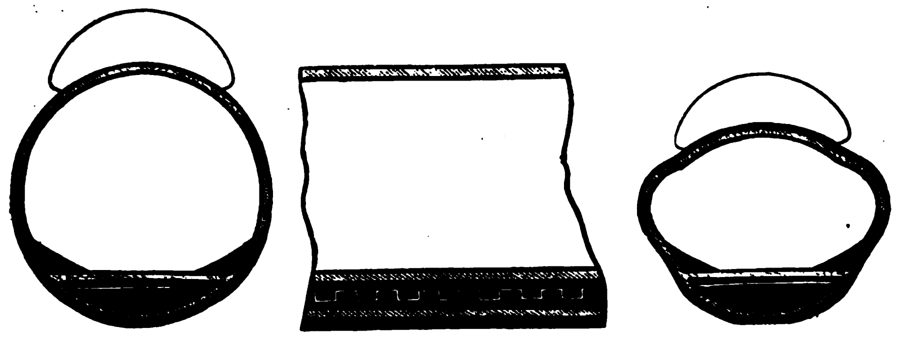
Dunn's Narrow Tread Vehicle Tire.

A form of pneumatic tires for vehicles embodying novel features of construction has recently been invented by Thomas Dunn, of London, an English tire expert, and is soon to be placed upon the English market, we understand. The chief feature of this tire is that it has a transversely inflexible tread, while longitudinally the tread is exceptionally flexible. The advantage of this feature Mr. Dunn explains in an article sent us, in part as follows:

"As now commonly constructed, the various parts of the pneumatic tire—the tread, the sides and the base—always occupy the same positions and fulfill the same functions. But these functions being essentially different in each case, it is obviously necessary to secure the maximum efficiency of the tires, that each part should be specially designed to fulfill in the most efficient manner the particular function it is required to perform. Elementary as this is it does not appear to have yet been generally realized, and tires are still commonly made of practically equal flexibility at every point in every direction, and with one part differing from another only as regards a slight thickening of the tread. To determine how each part may best be modified to most efficiently fulfill its special function, it is necessary to carefully consider the action of the tires. On doing this one point stands out conspicuously from the first. It is that the flection of the tread of an ordinary tire as it flattens on the road surface is immensely more acute transversely than longitudinally. The degree of this flection in the two directions differs inversely in the same proportion as the diameters of the circles formed by the outside circumference of the wheel, and by the sectional circumference of the tire. The outside circumference of the wheel being of from 28 inches to 40 inches diameter and the sectional circumference being usually from 2½ to 4 inches in diameter only, the flection is therefore ten to twenty times more acute transversely than longitudinally.

"The longitudinal flection of the tire due to its flattening on the ground produces only a slight distortion of the circular outside circumference of the wheel, but the accompanying transverse flection completely distorts the cross section of the tire, changing it from a circle to a flattened oval, thus indicating the great difference between the longitudinal and transverse flections.

"Since the distance along the flattened portion of the tire is less along the straight line than round, the flattening of the tire on the ground is accompanied by slight longitudinal compression of the tread, and it will thus be seen that it is essential to the resilience and durability of a tire that the tread should be capable of readily undergoing slight longitudinal compression and of readily expanding again. This is the simple reason why all attempts to protect tires from puncture by placing steel



THE DUNN PUNCTURE PROOF TIRE.

bands or other hard incompressible bodies in the tread have so signally failed.

"On further consideration it will be seen that the acute transverse flection of the tread of an ordinary tire as it flattens on the road serves no good purpose, but on the contrary impairs the resiliency and durability of the tires. It is simply an inherent defect in the action of ordinary tires, due to their construction. If, however, the acute transverse flection of the tread be prevented without diminishing the longitudinal flexibility and elasticity of the tread, not only will the loss of power due to this acute transverse flection be saved, and the tire be improved in ease of running, but the tread may then be thickened and strengthened, and generally so constructed as to most efficiently fulfill the special functions it is required to perform.

"It is unnecessary to describe here in detail the various methods, specially adapted for different purposes, which have been devised to prevent this acute transverse flection taking place in the tread. It may be simply explained that the treads should be made with a flat surface inwardly, which for ordinary vehicle tires should be of the maximum practicable breadth, and with a comparatively narrow surface outwardly, and that in reconstructing the tread of a tire due regard must be paid to the two following points: That the longitudinal flexibility and elasticity of the tread must not be impaired, and that transverse flection must not be allowed to continually occur at the points when the flexible sides and the transversely rigid tread meet, but that the transverse flection shall be fairly distributed over the sides of the tire. When properly constructed there need be no greater flection at these points than at the corresponding points where the sides meet the rim or the base, the flection at which latter points is common to all tires.

"When an ordinary tire (the cover of which is equally flexible at every point in every direction) runs upon the ground under a given weight, the part bearing on the ground continuously flattens thereon considerably, and an area of support is thereby formed on the body of compressed air within the tire of sufficient extent, according to the degree of the air pressure, to support the weight. The area of support thus continuously produced is of a long elliptical form, and, on any further compression of the tire in passing over the undulations of the road surface, it increases in size in practically every direction simultaneously. The increase of the total extent of the area of support (and of the tire's consequent resistance to further compression) is, therefore, very rapid in proportion to the amount of the compression of the tire producing the increase, so that the final limit of the compressibility of the tire by the weight upon it is with such a construction quickly reached, and its range of spring is consequently very limited.

"An important advantage of this construction is that it produces a constant narrow running surface which prevents skidding and minimizes the amount of dust stirred up.

"A transversely inflexible tread prevents a tire 'swallowing' small obstacles or lumps on the road as ordinary tires do; but when it is associated with a narrow running surface, the tire will entirely escape, or the shape of the tread will enable it to push aside many small obstacles other tires would necessarily pass over; while the greater range of spring the tire then possesses in proportion to its size, as above explained, gives it much greater ease in traveling over the undulations of an ordinary road surface, and this appears to be much the most important property for a tire to possess as regards its action in absorbing vibration and securing ease of traveling."

The Dunn tire is made with a tread, as shown in the figures, containing a corrugated steel band, with the corrugations running transversely.

Long Island Highway Protective Society Incorporated.

The Long Island Highway Protective Society, of Oyster Bay, Nassau County, N. Y., filed its articles of incorporation with the Secretary of State at Albany on Tuesday of last week. The objects of the society, as already reported, are to protect all users of the highways of that section from the encroachments of automobile users, to co-operate with the authorities in the enforcement of laws governing the operation of automobiles and to promote legislation against the reckless driving of motor vehicles.

The directors are R. W. Gibson, Thomas S. Young, Jr., W. Emlen Roosevelt, William J. Youngs, Arthur D. Weekes and C. W. Wetmore, of Oyster Bay; William F. Sheehan and George R. Sheldon, of York city; William J. Matheson, of Spring, L. I.; William H. Baldwin, Locust Valley, L. I.

Rhode Island Automobile Cl Races.

The Rhode Island Automobile Clu hold its race meet at Narragansett Providence, on Wednesday, Septemb The following events are scheduled:

1. Gasoline over 1,300 pounds, limi 30 horse power and under. miles. 1st prize, full value, $1c prize, full value, $50.
2. Gasoline, 1,300 pounds and under. miles. 1st prize, full value, $1c prize, full value, $50.
3. Gasoline. Free to all. Five mile prize, full value, $100; 2d priz value, $50.
4. Special, 15 horse power Winton t cars only, in racing trim, same s et and gears as used in regular cars. Five miles. 1st prize, full $100; 2d prize, full value, $50.
5. Steam, regulation stock cars, no c allowed, all weights. Three 1st prize, full value, $100; 2d full value, $50.
6. Open class for steam cars. Three 1st prize, full value, $100; 2d full value, $50.
7. Open class for electrics. Two 1st prize, full value, $100; 2d full value, $50.
8. Special. Motor bicycles. Singl chines. Open class. Five miles eligible to sweepstakes. 1st pri value, $50; 2d prize, full value,
9. Sweepstakes, open to all winners ulary classes. Five miles. 1st full value, $100.

Entries close September 22, with tary H. H. Rice, at the Crown Hotel, idence. The entrance fee is $10. A will be made in cash or plate, but m specified on the program to assur value.

The Upton Gasoline Delivery in Service in Boston.

Messrs. Houghton & Dutton, o ton, Mass., who were among the pi in practical experiments with elect livery wagons, are now employing i regular delivery service a gasolin manufactured by the Upton Machin pany, of Beverly, Mass.

The body of the vehicle is that of the firm's two horse covered wagor is mounted upon the Upton running which is furnished with wood equipped with 3½ inch solid rubber year tires. The motor is of 20 power, and the transmission is th known Upton type, with two spee reverse. Wheel steering is used, a wagon is capable of traveling at all up to nearly twenty miles per hour.

It has been in practical use for

six weeks, covering a long suburban route, and makes an average mileage of fully fifty miles, with about 100 stops. The load carried is sometimes nearly a ton, and the vehicle accomplishes the work for which five horses were formerly required.

It is stated that during the six weeks which it has been in use the vehicle has never been out of service a single day, and has never required assistance on the road.

Another similar vehicle is expected in the near future, and will be put into service at once.

The La Roche Gasoline Engine.

The F. A. La Roche Company, of 652 Hudson street, New York, is manufacturing a line of gasoline engines for automobile, launch and stationary work, of which the leading features appear to be simplicity and accessibility.

These engines are equipped with an automatic governor to prevent racing when the clutch is disconnected from the running gear, and it is said that for the same dimensions as the Darracq, they indicate 1 horse power in excess of that motor.

We have in preparation cuts and detailed description of the new engines.

Owen Case Decided Adversely.

In the case of the People of New York against Wallace H. Owen, a chauffeur, of Brooklyn, New York, who was charged with violating the automobile law of the State, the trial, which had been several times postponed at the request of attorneys, took place on Tuesday, September 16, at Freeport, L. I., before Justice Wallace and a jury.

The defense was undertaken by the American Motor League, of which Isaac B. Potter is counsel. The line of defense adopted was to cast doubt upon the timing device of the constables who made the arrest and to set up the contention that the 8 mile an hour law was never intended to apply to the outskirts of villages or even to the villages themselves, since the limit in cities, town and villages is left to the discretion of the municipal authorities. According to the official timing, Owen was running at the rate of 12 miles an hour. He claimed, however, that his machine was going within the restricted legal rate.

The prosecution insisted that the only point for the jury to consider was as to the guilt of the defendant in driving an automobile faster than 8 miles an hour, the justness of the law and the possible intent of its maker being outside their province. This was also the burden of the judge's charge.

In less than half an hour the jury returned a verdict of guilty, whereupon a fine of $35 was imposed.

Attorney Potter served notice of an appeal, and the case will go to a higher court. Before the jury was sworn in an effort was made to show defects in the warrant and the complaint, but without avail.

Entries for A. C. A. Reliability Run.

The following entries had been received by the secretary of the club up to 3 p. m. on Tuesday:

No.	Class.	Maker.	Entered by
1	C	Ohio Automobile Co	Harlan W. Whipple.
2	C	Ohio Automobile Co	Henry B. Joy.
3	C	Ohio Automobile Co	Adams-McMurty Co.
4	C	Ohio Automobile Co	Adams-McMurty Co.
5	B	Prescott Automobile Mfg. Co	Prescott Auto. Mfg. Co.
6	B	Foster Automobile Mfg. Co	Foster Auto. Mfg. Co.
7	B	Lane Motor Vehicle Co	Lane Motor Vehicle Co.
8	B	Lane Motor Vehicle Co	Lane Motor Vehicle Co.
9	C	Pope-Robinson Co	Pope-Robinson Co.
10	B	Haynes-Apperson Co	Haynes-Apperson Co.
11	B	Haynes-Apperson Co	Haynes-Apperson Co.
12	B	Haynes-Apperson Co	Haynes-Apperson Co.
13	B	Autocar Co	Autocar Co.....
14	B	Autocar Co	Autocar Co.....
15	B	Ward Leonard Electric Co	Ward Leonard Electric Co.
16	B	Ward Leonard Electric Co	Ward Leonard Electric Co.
17	C	Apperson Brothers	Apperson Bros. Auto. Co.
18	C	H. Bartol Brazier	H. Bartol Brazier.
19	C	Torbensen Gear, Incorporated	Torbensen Gear, Inc.
20	A	The Geo. N. Pierce Co	The Geo. N. Pierce Co.
21	B	A. Darracq & Cie	Harold H. Brown.
22	B	Foster Automobile Mfg. Co	Foster Auto. Mfg. Co.
23	C	Adams-McMurtry Co	Adams-McMurtry Co.
24	B	White Sewing Machine Co	P. H. Deming.
25	B	White Sewing Machine Co	Windsor T. White.
26	B	White Sewing Machine Co	White Sewing Machine Co.
27	B	White Sewing Machine Co	White Sewing Machine Co.
28	B	White Sewing Machine Co	White Sewing Machine Co.
29	C	Locomobile Co. of America	A. L. Riker.
30	B	J. Stevens Arms & Tool Co	J. Stevens Arms & Tool Co.
31	B	J. Stevens Arms & Tool Co	J. Stevens Arms & Tool Co.
32	B	Thomas B. Jeffery & Co	Thomas B. Jeffery & Co.
33	B	Grout Brothers	Grout Brothers.
34	C	Locomobile Co. of America	S. T. Davis, Jr.
35	A	Locomobile Co. of America	Locomobile Co. of America.
36	A	Locomobile Co. of America.	Locomobile Co. of America.
37	B	Elmore Mfg. Co	Elmore Mfg. Co.
38	B	Elmore Mfg. Co	Elmore Mfg. Co.
39	B	De Dion-Bouton Co	Kenneth A. Skinner.

H. B. Shattuck & Son, of Boston, Mass., have also entered four cars—a Packard, an Auto car, a Searchmont and an Oldsmobile, which have not yet been classified or given numbers.

The Cleveland Races.

The Cleveland Automobile Club held its races yesterday, Tuesday, favored by fine weather. The track was in good condition, the 10 mile record for tracks and other records were broken, and there were no accidents. The complete program was not carried out, however, owing to darkness setting in.

Following is a summary of the results in the various events that took place:

Five mile race for steam carriages—Paul Deming (White), Cleveland, winner; John McDonald (Geneva), Geneva, Ohio, second. Time, 9m., 53½s. One White machine was disabled at the start.

Five Mile Race for Gasoline Vehicles Under 1,000 Pounds—H. S. Moore, Cleveland (Elmore), winner; I. D. Dixon, Cleveland (Hansen), second. Time, 11m., 19½s.

Special Five Mile Record Race for Steam Carriages—The record was broken by Rollin White on a White racer. Time, 6m., 43s.

Five Mile Race for Gasoline Vehicles Under 2,000 Pounds—H. S. Harkness, New York (Mercedes), winner; C. B. Shanks, Cleveland (Winton), second; Percy Owen, New York (Winton), third. Time, 6m., 32¾s.

Three Mile Race for Electric Vehicles—Walter Baker, Cleveland (Baker); time, 5m. 54¾s.

The Baker torpedo could not take the turns, and for this reason failed to make time.

Ten Mile Handicap Race—Rollin White, Cleveland (White), winner; Percy Owen, New York (Winton), second; time, 14m. 59½s.

WINTON BREAKS RECORD.

Ten Mile Open Race—Alexander Winton broke the record in 10m. 50s. The best time for the mile race was 1m., 2s., also a record.

Ten Mile Handicap, Open Race—Percy Owen, New York (Winton), winner; Paul Deming, Cleveland (White), second; time, 13m. 34s.

MOTOR VEHICLE PATENTS..

United States Patents.

708,579. Driving Gear.—John Nutry, of Midland Park, N. J. September 9, 1902. Filed October 1, 1901.

A variable transmission for automobiles, of the "variable throw" type. A novel feature of this invention is that the motive is taken directly from the reciprocating piston of the engine by the reciprocating rods of the transmission, without being first transformed into rotary motion. One of the claims describes the invention as follows:

The combination of a reciprocating driving member, a driven part mounted to turn, a connecting mechanism from the driving member to the said part, the latter being provided with a guideway on which said connecting mechanism is adjustable, the said guideway being arranged substantially radially with respect to the axis of the driven part, and having at its outer portion a lateral extension on which said connecting mechanism may move when in its outer position, said mechanism being adjustable on the driven part from its outer position at which the driving member moves without affecting the driven part, to a maximum of rotary speed of the driven part, and means for adjusting said connecting mechanism.

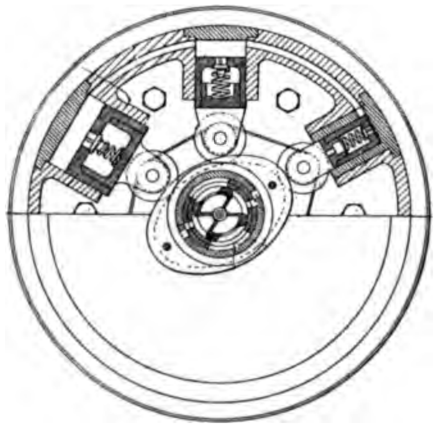
708,694. Method of Manufacturing Secondary Battery Plates.—George H. Christian, of Cleveland, Ohio. September 9, 1902. Filed December 7, 1901.

The invention is particularly directed to the preparation of the spongy lead element of such batteries—an electrolyte containing a compound of an organic reducing agent, wherein it is necessary to convert the lead oxide previously formed or existing into spongy lead.

Grooved lead plates are suspended and formed in an electrolyte consisting of a solution of a compound of an organic acid with an alkaline earth, such as oxalate of potassium, oxalate of sodium, etc. The oxalate is prepared in solution with water. The peroxide plates are suspended in such electrolyte, so as to form the negative electrodes, plain lead plates being used for the positive electrodes. Upon the passage of the current, which is preferably of about one-half ampere per square inch of plate surface, the peroxide is rapidly deoxidized, forming spongy lead, and in the ordinary 5x7 inch plates is completed in about seven to twelve hours. The solution is maintained at the above named strength during the electrolytic action by continually adding as is required the oxalate to replace that decomposed by the electrolysis. The plain lead sheets should be about one thirty-second of an inch in thickness, of the same width as the peroxide plates, and separated from the latter by hard rubber strips or bars about one-eighth inch in diameter or one-eighth inch by one-fourth inch to prevent short circuiting. The spongy lead plates are then removed from the electrolytic bath, immersed in a bath of running water, and permitted to remain therein for about twelve hours in order to thoroughly remove the oxalate and other substances remaining in the pores of the lead. The spongy lead plates are now ready for use in the secondary battery.

708,697. Engine.—Thomas Deakin, of Eccles, England. September 9, 1902. Filed December 5, 1901.

The invention relates to an engine or motor comprising a series of inwardly-directed cylinders arranged radially relative-

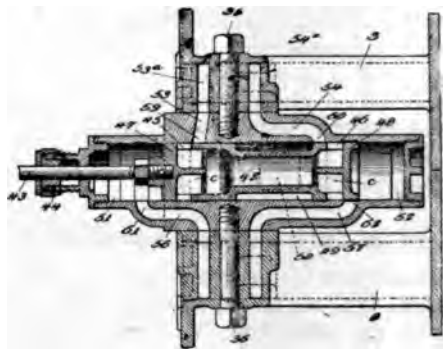


ly to a flywheel and adapted to rotate therewith, the pistons acting upon the periphery of an elliptical or otherwise suitably formed track or tracks arranged around the shaft of the engine, such shaft being stationary, hollow and provided with suitable ports for the admission of steam or the like to and its exhaust from the cylinders.

The engine comprises a hollow shaft built up of two similar parts having flanges at their adjacent ends and hexagon peripheries at their other ends. The two parts of the hollow shaft are connected by bolting together the flanges, the peripheries of which form a track of elliptical form. The track is provided with lateral guides. The shaft as a whole is held in position and prevented from rotating by locking its noncircular ends in standards rising from a base plate. Live steam is admitted at one end of the shaft and passes out therefrom through a radial port. The exhaust returns into the shaft through another radial port and escapes through the other end of the shaft. Concentrically with the shaft is mounted a flywheel, constructed with one or more webs or spokes arranged laterally. Inside the wheel are provided a suitable number—say six—of radial cylinders. The inner ends of the cylinders are open, and the outer ends are closed, except for the admission and exhaust ports. The flywheel and cylinders are divided at the central plane into two parts to allow of its being located in position with its walls on either side of the track. Each wall of the wheel is provided with a concentric boss, forming a trunnion, which works in bearings in fixed pedestals, so that the valve faces on the shaft may be relieved of the weight of the wheel and the parts rotating therewith. In each cylinder is arranged a piston, and each piston carries a roller adapted to run around the track. An endless steel band is fitted around all the rollers to hold them up to the track against the centrifugal force when the steam is exhausted. Radial steam passages are provided in the walls of the wheel and are adapted to communicate between the ports in the hollow shaft and the ports leading to and from the closed ends of the cylinders.

Some of the drawings show the engine applied directly to an automobile wheel.

708,758. Steam Motor.—Irving S. Davis, of Scranton, Pa. September 9, 1902. Filed November 2, 1901.



Relates to a four cylinder, single acting steam motor for automobiles, completely enclosed. The four cylinders are arranged parallel with each other, with their centre lines forming the corners of a square. Two of the cylinders are to receive high pressure steam and the other cylinders the exhaust steam from the high pressure cylinders; in other words, the engine is to be operated compound. The two high pressure cylinders and the two low pressure cylinders have each a separate crank shaft with two cranks set at 180 degrees with each other and the two shafts are connected by spur gears.

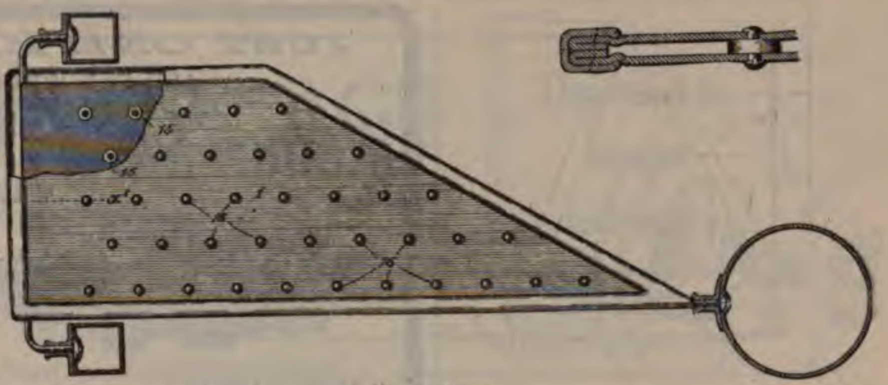
Parallel with the four cylinders are arranged four valve chests in which are placed a form of piston valve, simpler, of course, than the ordinary piston valve because the cylinders are only single acting. Each of the valve chambers has one communication with its cylinder and two communications with a chamber in which is located a combined reversing and simple compound transforming valve. The latter valve is located centrally of the other four, and as it is apparently the most important part of the invention it will be described at some length.

Referring to Fig. 2, it will be seen that in the position which the controlling valve occupies no steam can enter the engine cylinders from the steam port 50. When the controlling valve is moved to the right, however, until the ports 45 and 46 register with the ports 59 and 62, respectively, steam

pass from the steam port 50 through 60 into the passageway 54 and from e to both high pressure valve casings. eccentrics are so arranged as to admit to the high pressure steam cylinders iately. After the steam has entered f the cylinders it will, after the piston nished its stroke, exhaust through the geways 55 and 53, ports 59 and 45, into through the controlling valve, and e by way of the ports 46 and 62 and assageway 57 into the low pressure cylinder, from whence it will be ad- l through passageway 58a, the low ure cylinder, which is diagonally op- the high pressure cylinder. After team has expanded in the low pres- cylinder and driven the piston therein rd the forward movement of the low ure valve will permit the steam to es- at the rear of the valve into the pas- ay 56, and thence through the valve C and exhaust passageway 51 to the st pipe 41.

the position of the controlling valve the ports 45 and 46 register with the 59 and 62, respectively, therefore, the es will run in one direction—forward ompound engines. If the controlling be moved farther inward—that is, to ght in Fig. 2—until the left hand end the valve passes the port 59 and the 60 and 62 are both in communication the steam space 49, the engines will s simple engines in the same direc- team at full boiler pressure being ad- l to the high and low pressure cylin- hrough the ports 60 and 62 and ex- ng through the ports 59 and 61 into ft hand end of the casing, thence g into the exhaust passageway 51.

rder to reverse the motor, the con- g valve is moved outwardly to the ne left in Fig. 2, when the port 59 e in communication with the steam 49, the valve port 46 will register the steam inlet 50 and port 45 with it, and the ports 60 and 62 will both communicate through the right hand end of the valve casing with the exhaust passageway 52. Live steam will then be admitted through said port 59 to the high pressure cylinders and through ports 46, 45 and 61 to the low pressure cylinders, and the exhaust will pass through ports 60 and 62 to the passageway 52. The engine will therefore run backward as a simple engine.



No. 708,712.

708,712. Condensing or Cooling Apparatus.—C. C. Hill, of Chicago, Ill. September 9, 1902. Filed October 23, 1901.

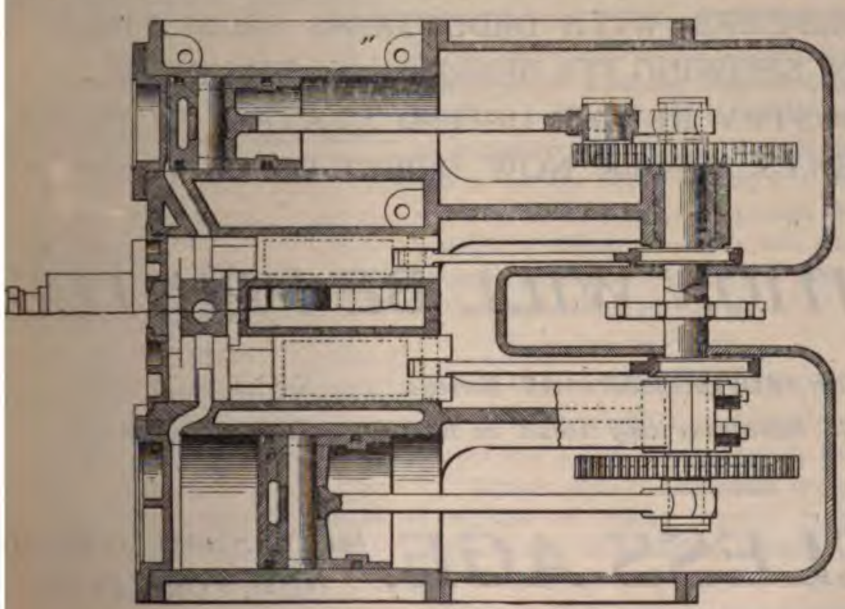
A condenser and cooling device for motor vehicles, either steam or gasoline. The apparatus consists of a series of condenser or cooler sections arranged in parallel and separated relation, each consisting of a pair of separated parallel plates secured together at their marginal edges by a connecting binder cap and at points intermediate of the surface of such plates by a series of stay rivets. A header connected to the exhaust of the engine is arranged transversely of the series of condenser sections and provided with individual necks for connection with such condenser sections. A duplicate arrangement of the header is employed and arranged, respectively, at the upper and lower forward ends of the condenser sections with a view to attain a more effective distribution of the steam into the series of condenser sections and at the same time afford a very effective detachable connection and support for the condenser sections. The outlet or discharge header, at the right in the drawing, is connected to the receiver for the condensed water.

708,953. Pneumatic Tire and Process of Manufacturing Same.—J. W. Blodgett, of Chicago, Ill. September 9, 1902. Filed January 9, 1902.

708,793. Motor Vehicle.—Henry F. Borbein, of St. Louis, Mo. September 9, 1902. Filed July 24, 1902.

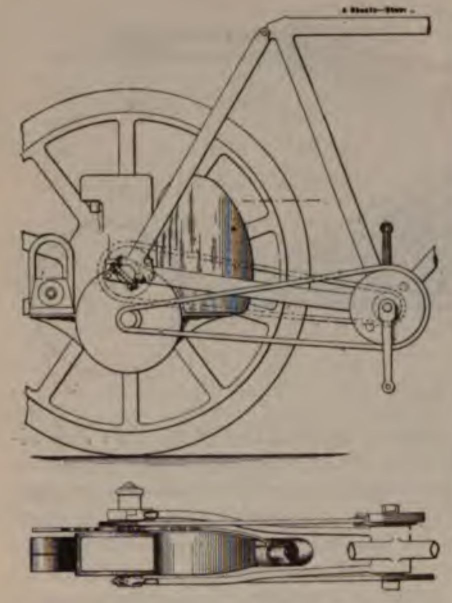
708,827. Motor Mechanism for Road Vehicles.—Edwin Perks and Frank Birch, of Coventry, England. September 9, 1902. Filed June 4, 1902.

This invention relates to improvements in the Singer motor bicycle, with motor located in the driving wheel whereby the motor, although contained within the wheel, shall not be wholly enclosed therein, but shall be quite open to access upon one side of the wheel for oiling, cleaning and adjusting; and the object is at the same time to so arrange that the motor shall be in a position to be readily connected with reserve tanks when traveling long distances; further, that the motor shall be capable of being connected up with controlling rods for operating the engine without such actuating connections passing through hollow trunnions.



No. 708,758.

To secure these ends in view the inventors provide a concave road wheel within the concavity of which the motor is located, its location being such that the hub of the road wheel is carried upon one of the trunnions by which the motor is supported, while the opposite trunnion is fixed in an adjustable manner to the framework of the machine, the axis of the motor crank shaft being eccentric to the axis of the trunnions and the road wheel. From the motor crank shaft are provided driving connections by which the motion of the crank shaft is transferred at a reduced speed to the road wheel. The arrangement of the motor within the concavity of the road wheel with its motor shaft eccentric to the axis of the wheel permits to connect the motor shaft so as to drive a countershaft, which latter is mounted in bearings on the framework of the vehicle, and to then drive the road wheel from the countershaft. This ar-



rangement of driving gear presents advantages in that, for example, it provides simple means for the reduction of speed between the motor and the road wheel, while it also allows of the convenient application of overrunning clutches for freeing the engine and for freeing the pedal driving shaft where such is employed.

708,864. Resilient Tire for Vehicle Wheels.—William E. Carmont, Kingston-upon-Thames, England. September 9, 1902. Filed March 10, 1902.

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BEGINNERS PAGE.

A series of articles for the beginner in automobilism, commenced in issue of March 26th and to be continued for a year or more; defining all terms used, illustrating and describing in the simplest form the different motive powers and all parts of the automobile.

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The Cost of Manufacture.

There is much misinformation abroad regarding the cost of production of automobiles and of parts. Automobile owners are frequently under the impression that enormous profits are being made by the manufacturers, and the same impression prevails to a large extent among people looking for some kind of business to engage in. To quote a circular of some automobile promoting scheme recently received, the impression is that "the fortunes that will be made in the near future will be made in the automobile business."

Now, while the automobile business offers perhaps as good an opportunity as any to firms properly equipped, the chances for failure are also present, as unfortunately has been proven already by too many cases. To succeed in the automobile business, a firm must first of all have sufficient financial resources to properly equip a plant and establish a market for its products. The preliminary investment required is too often underestimated, as well as the actual cost of production, and as a consequence it not infrequently happens that a manufacturing company finds itself in financial straits when it has hardly begun operations.

In the manufacture of machines or machine parts the cost of production is not simply a question of so many hours of machine work at so much per hour. There are officers' salaries to be paid, general office expenses, advertising, taxes, insurance and a lot of incidentals which as long as the production is small must considerably influence the prices at which the products can be sold with profit. Firms contemplating entering the automobile business will do well to make careful calculations in advance of the investment required to get ready for business and of the actual cost of production, and if their financial resources are not strong enough, or if the cost of production figures out so high that it would be difficult to compete with similar goods already in the market, it will be advisable to abandon the project.

A Commendable Practice.

In conversation with a user recently we learned that a certain manufacturer, having through repeated breakages become aware that the steering knuckles on his machines were of insufficient strength, not only changed the design but replaced the knuckles on all the machines he had turned out with new and stronger ones, free of charge, not waiting until a failure of these parts should make a renewal necessary, but sending a man around to all the owners of machines of the type in question to put the new knuckles in. This manufacturer evidently realizes the business value of a reputation for "trying to make things right." The incident is an agreeable exception to the common complaints from customers that they cannot get manufacturers to make good their guarantees in case something breaks on the vehicle. The policy is worth imitating.

The Repair Question.

The scarcity of competent repairers and the high handed methods of some of the firms engaged in the automobile repair business still remain one of the rocks in the path of the average automobilist. The hope expressed on several occasions that competent repair men would eventually be graduated from the manufacturing works has so far failed of realization, first, because the number of repair men required before all places frequented by automobilists are supplied is very large, and, second, because there is a great demand in the works themselves for competent mechanics, and the manufacturers do their best to keep their men.

In regard to charges, automobilists must, of course, remember that if they require repairs in some out of the way place, and these require special facilities and equipment, they can hardly expect to have them made at the same figure as in a large metropolitan repair shop where there is a continuous run of business. Where a repair shop is established along the road specially for automobile, bicycle and sundry repairs, the owner will frequently have nothing to do but to look down the road for something to turn up, and the customer will have to pay for the time that was spent looking for him.

While these conditions justify an advance on the usual rates, there is certainly

a limit to the prices which can reasonably be asked for any given service, and there is nothing more detestable than taking advantage of the tourist's predicament to fleece him. If automobilists in the same community or members of clubs would inform each other of their experiences with different repair firms, it would prove an effective check to such hold up methods as have been reported in our columns and speedily run the sharks out of the business.

The same experience, moreover, has been passed through in European countries and in order to improve the situation the A. C. G. B. and I. has undertaken to recommend repair shops where good work is done and where customers are treated civilly. The French Automobile Club also, if we are not mistaken, has compiled a list of competent repair men for the benefit of its members.

It is obvious that such a system is bound to be productive of much good, for it advertises the firms that have secured the license of the club and makes it obligatory upon them to accord customers proper treatment. It was reported some time ago that one of the automobile clubs in Massachusetts had made an agreement with a local storage and repair station regarding special privileges for its members. While this may be a good move, it would be much more sweeping if the American Automobile Association could license and recommend to its members repair shops in all parts of the country frequented by automobilists. To this end it is extremely desirable that more of the clubs should join the A. A. A.

Combination Systems.

In our correspondence column this week appears a letter from a reader who takes exception to some of our remarks in a recent editorial on "Revolutionary Inventions."

Our correspondent has given our words a wider meaning than they were intended to convey. If we said anything derogatory to the combination system, we would here state that we do not for a moment deny this system the right of existence. As long as automobiles are pleasure vehicles chiefly, their success or non-success will depend very largely upon the personal inclinations of the owner. For instance, as between steam and gasoline, some people prefer a steam carriage because with it they are able to follow, to a certain extent, the variations in the processes of power generation as expressed by the various indicators, which affords them a peculiar satisfaction, while others are differently inclined. So why should there not be some who would take a fancy to electric transmission, with which the various variable factors are also constantly indicated by instruments and which has other features captivating to the lay mind, such as the transmission of horse powers through a small stationary wire? We are thoroughly convinced that vehicles can be built on this system to be as fast as the law allows them to run, as comfortable as any, and as safe.

On the other hand, in the case of many prospective purchasers a factor demands consideration which is entirely independent of personal fancies—the cost of keeping and using the machine. This factor will largely be determined by the first cost, economy of the power equipment and the complication of the machine.

We have already stated that a wheel motor running at an average speed of perhaps 200 revolutions per minute will necessarily be of low efficiency and very heavy. If we discard the wheel motor we must introduce gearing, and as soon as we do that we do not substitute electrical for mechanical transmission, but add the former to the latter.

Most of the lighter type of gasoline carriages have a direct drive on the high gear, on which they run perhaps over 80 per cent. of the time. The transmission is then by chain (as a rule) direct to the rear axle. Now there is no reason why the percentage of loss in the chain should be any greater than the percentage of loss in the electric motor gears. In fact, we would expect it to be somewhat smaller, since the chain is generally considered the most efficient system of transmission. All losses in the electric motors, in the dynamo, in the batteries and in the wiring are therefore extra losses for which there is no equivalent in the gasoline carriage of the type referred to.

This loss would hardly be less than 40 per cent. and certainly not less than 30 per cent The only condition under which the comparison would be more favorable to the combination system is when the gasoline carriage is running on the hill climbing gear, and then the figures would not be changed very much, as electric motors when overloaded are not very efficient.

The transmission gear of the lighter gasoline carriages usually weighs approximately 100 pounds, for a motor of from 5 to 8 horse power. It is obvious that an electric generator, two motors, a controller and a storage battery, all of such capacity as to be able to take care of this power, would be of very much greater aggregate bulk and weight. It is perfectly true that the generator may take the place of the engine flywheel, but the actual value of this possibility is likely to be greatly overestimated by the layman. In the first place in practical work only one of the two separate parts of an electric generator can be made to rotate, and this part weighs, as a rule, less than one-half the weight of the whole generator. Then, since this part has cotton insulated wire wound upon it, its peripheral speed must be restricted far below what is allowable in a cast iron flywheel. Now, the flywheel capacity of a given mass varies as the square of the speed. For instance, if a cast iron flywheel with an average rim diameter of 20 inches is to be replaced by a dynamo armature with a mean effective diameter (considered as flywheel) of 15 inches, the latter must be nearly twice as heavy. It will thus be seen that at most one-third of the weight of the generator can be saved by making it do flywheel duty.

The alleged advantage that the engine in a combination system is constantly running at the same speed is a negative one. Both the wear and tear and the fuel consumption in a gasoline engine are reduced when the motor is throttled down to half speed and taking, say, only half charges in each cycle.

On the other hand, it is sometimes asserted that by combining the two powers all the advantages of the two are combined and all the disadvantages avoided. Let us see. Of the gasoline vehicle they (its enemies) say that it is noisy, ill smelling, vibrates much, requires the use of an inflammable liquid and comprises complicated mechanism. Of the electric vehicle they say that it is ponderous, generates noxious acid fumes, is liable to a rapid deterioration of the battery and has only a short mileage. Now, how many of the weak points of these two systems can be eliminated by the combination of the two powers? Apparently only the last mea-

tioned one. That the gasoline motor runs continuously at constant speed will not prevent the spark plugs from getting fouled, the trembler points burnt, dirt or water getting into the gasoline or the ignition circuits from leaking. These weaknesses of gasoline engines will develop whether we have electrical transmission or mechanical.

These are some of the reasons why apparently we cannot have "a machine combining the * * * ease of operation of the electric with the * * * reliability and cost of operation of the gasoline."

Maybach's Cellular Cooler.

Many who have had occasion to examine the water cooler on the Mercedes machines have undoubtedly wondered how it was constructed. When the joints are made flush with filler and the whole is heavily covered with paint, it is difficult to say after a mere casual inspection what has been the method of construction employed. The enormous number of the cells gives one the impression that casting would be the only method by which the coolers could be made economically, while on the other hand it is difficult to see how the apparatus could be constructed by any casting process.

As will be seen from the description in our patent columns, the apparatus is entirely constructed by ordinary machine shop methods, of tubes and wires, with soldered joints. It forms therefore a logical development of the old Daimler cooler, a wire netting having been substituted for a pierced tube sheet and square tubes for round ones, the object being, of course, to reduce the water capacity for a given cooling surface. The description of the method of construction makes it plain that the apparatus is very expensive to build.

The efficiency of this apparatus as a means for disposing of the heat imparted to the cooling water through the cylinder walls is very high, especially when air is forced through the cells by a fan, and the system is meeting with favor in France, where it has been adopted by a number of manufacturers. There seems to be only little room for improvement left as regards the amount of cooling water required, and the weight and bulk of the cooling apparatus. Further advances may be expected chiefly in the direction of cheapening the cost of construction, and as America is essentially the home of improved manufacturing methods it is to be hoped that some American engineer will take up the problem of improving the process of constructing cellular coolers and reduce their cost so as to make them applicable to low priced machines, as well as to the most expensive, to which they seem now confined. The annoyance sometimes caused automobilists by having to fill their water tanks away from home makes it appear that a cooler preventing practically all evaporation would be a very desirable feature of any gasoline carriage.

Cylinder Lubrication.

By J. S. V. Bickford.

There is probably no subject connected with engineering on which, as a general thing, the enthusiastic amateur is more ignorant than lubrication in general and cylinder lubrication in particular. It is therefore probable that a few notes on the subject may be of interest.

To many people oil is oil and nothing else; in other words, all oils are more or less the same and may be used for anything provided they are not too thick. Of course, this is a most pernicious fallacy.

Oils may be roughly divided into two classes, mineral or hydrocarbon oils and vegetable and animal. The former of these contain no oxygen and are very little affected by exposure to the atmosphere and little changed by heat, while the latter are all more or less subject to alteration. Further, all animal and vegetable oils are capable of forming fatty acids in the presence of alkalies or superheated steam, and most of them contain, in their natural state, a considerable quantity of fatty acid in the free state. These fatty acids are very bad for bearings, particularly those containing tin, and for this reason no natural oil should be used for lubricating purposes. For instance, pure natural olive oil often contains as much as 20 per cent. of free fatty acid, which obviously renders it unfit for lubricating purposes.

From this one is apt to jump to the conclusion that it is better to use pure hydrocarbon oils only, and to a certain extent this is true, but it must be remembered that animal and vegetable oils, as a rule, have much better lubricating properties than hydrocarbons, and for this reason most of the oils on the market are a mixture of the best refined hydrocarbons and fatty oils which have been carefully prepared so as to neutralize them.

There is, of course, only one way to really test a cylinder oil, and that is to set aside an engine similar in all respects to that in which it is proposed to use the oil and run it for a prolonged period with the oil to be tested, making careful notes of results. Obviously, this must be a very tedious and expensive process, and the writer quickly came to the conclusion that something more expeditious must be found. It was assumed that the lubricating properties of the oils to be tested, which were all pure hydrocarbons, would be much the same, and it was therefore decided to test them for heat resisting properties alone. It should be pointed out that as the oils were to be used with an engine working with a flash boiler delivering steam sometimes at a temperature of as high as 1,000° Fahr., nothing but hydrocarbon oil was possible, as any animal oil would be immediately decomposed, with disastrous results. It was thought that if the oils were all tested for heat resisting properties in the same way some guide would be had to their usefulness.

Samples of oil recommended for the purpose in hand were obtained from several makers. These fell naturally into two classes—1, filtered; 2, unfiltered. The filtered oils have been filtered through animal charcoal and are of a greenish color, and are transparent when in thin films, while the natural or unfiltered oils are almost black, and are quite opaque.

All the oils were treated as follows:

A small tin dish was weighed and about half an ounce of oil was measured into it. The whole was then weighed again and placed on a sheet of iron over a Bunsen burner supplied from a governed gas supply. At the end of half an hour the whole was weighed again, and again at the end of three and six hours. Hardly any of the oils had skinned over at the end of six hours, and very few of them were unskinned at the end of twelve hours.

As all the oils were of English manufacture, except one, it is scarcely worth while mentioning details of the tests, except that of the filtered oils one by the Price's Candle Company, of Battersea, London, came out best, while of the unfiltered oils the H. Wells Oil Company's showed to advantage. These two makers were, however, very close to each other and considerably above any others tested. It should, of course, be mentioned that the tests do not show which oil is best for lubricating purposes, and it is not pretended that they do, but as a slight addition to a little known subject the results are of some interest. It may be added that the best oils tested lost weight as follows, in the times mentioned:

	Percentage of Loss.			
	30 Min.	180 Min.	360 Min.	15 Hrs.
Price-Sherwood	0.8	3.4	8.3	...
H. Wells dark......	Nil.	Nil.	1.0	5.4

It should be pointed out that in all experiments of this sort it is very necessary to insure uniform heat. In the first two or three trials the results were most confusing, and could not be made to agree among themselves. This was found to be due to the change in the pressure of the gas from night to day and back again, a change which amounted to nearly 2 inches water gauge. To overcome this it was necessary to put a governor on the supply of gas, and a short description of this may

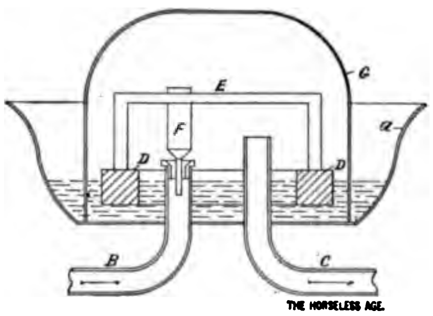


FIG. 1.

be of interest, as it is quite easy to make and is cheap.

Referring to Fig. 1, A is a shallow dish of tin plate or copper through the bottom of which pass the supply pipe B for gas and the delivery pipe C to the burner. Surrounding the ends of the pipes inside the dish A is the annular float DD, carrying the bridge E, through which passes a pin projecting down into the supply pipe B. Over the whole apparatus, as shown, is an inverted bell glass G. The dish A is partly filled with water. The action is as follows:

Before the gas is turned on the water will stand at the same level inside and outside the bell glass, and the pin F will be some little way above the tube B. It is, of course, necessary to make the pin F with a long point so that it will not altogether leave the end of the tube B. As soon as gas is turned on it begins to force the water out from under the bell glass into the dish A, allowing the float to fall. This soon results in the checking of the gas supply, which prevents the pressure rising above this point. If it is desired to raise the pressure, more water is added to the pan A, and vice versa. The apparatus is very steady in its action, which can be observed through the bell glass.

Oils tested as described above should have as little loss as possible if they are to be used for superheated steam, and it would doubtless be of interest if some reader of THE HORSELESS AGE would conduct a few experiments on the leading oils of the United States.

A gentleman who assisted Mr. Hyler White in the experiments which accompanied his article on steam car construction, published in THE HORSELESS AGE some time since, communicated with the writer regarding an experiment which he conducted and which led to different results in some respects. He set an engine running with steam at, he said, 1,700° Fahr. It is very difficult to believe that the steam at the engine could be anything like this, as it is above the temperature of melted brass

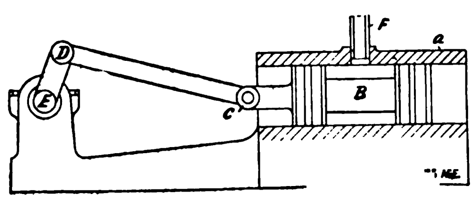


FIG.

or nearly so. Into the steam pipe of this engine the oil to be tested was fed and a sheet of tin plate held opposite the exhaust. He says that Hecla oil (an unfiltered natural oil made by the Vacuum Company) was the only oil which came through in the form of oil, all the rest being entirely carbonized and coming out in dust. It occurred to the writer that a test of the lubricating properties of this dust, which must have been nearly pure flake carbon, would have been most interesting.

After the above tests were conducted the following method of practically testing cylinder oils occurred to the writer. It was pointed out by the H. Wells people that no test which did not actually similate the conditions of a steam engine, down to the conduct of the test in an atmosphere of steam, was of much practical use. For it was argued that though a certain oil behaves in a certain way in air when tested at a temperature of say 500° Fahr., this is no guarantee that it will behave in the same relative way in an atmosphere of superheated steam. The writer is of the opinion that this argument must be accorded great weight, and he has designed the following apparatus for testing cylinder oils under steam conditions which admits of actual measurement of the friction developed.

Let the piston valve B be fitted to the piston A with spring rings as in a cylinder. A piston valve is selected, as by having the steam between the ends of it the pressures on the crank pin can be equalized. Connect this piston valve to the crank E by the usual arrangement and rotate the crank shaft either through a dynamometer or by an electric motor fitted with measuring instruments, so that the power absorbed can be noted. The steam, in about the same quantity as would be used by the engine for which the test is being made, would be passed around the annular middle part of the piston valve, and the oil would be fed in at F or by a steam impermiator. This apparatus would admit of careful tests being made of the behavior of different oils when subjected to friction in an atmosphere of steam. A set of experiments on these lines is greatly wanted.

THE FEEDING OF CYLINDER OILS.

There are several ways of feeding the oils to the cylinders which have advantages of their own. The usual method is to pass the oil into the steam pipe and let the steam carry it to the cylinders. This method is very good in its way if properly carried out; but, as the following experiment will show, the result may be that all the oil goes to one end of one cylinder while none goes anywhere else.

The writer was considering the lubricating question, and wished to design a Roscoe type lubricator to be made of steam fittings, and did not know at what rate these lubricators would feed. To gain the necessary information he made a lubricator as follows (Fig. 3):

To one end of a 6 inch piece of ¾ inch

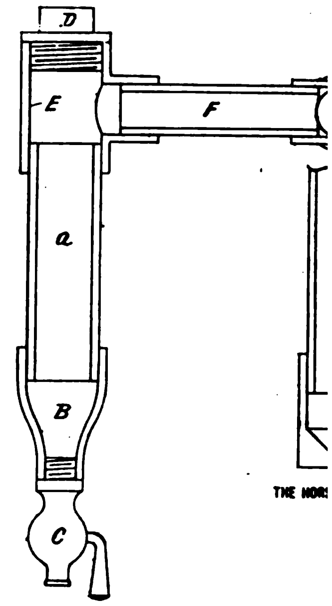


FIG. 3 AND 4.

gas pipe was screwed the reduci
B and to that was attached the d
C. To the upper end of A was
the reducing T fitting E with a fi
D and a lateral pipe F communica
the side of the steam pipe G.

The pipe A was filled with oi
the stopper D, which was repl
then steam turned on. The actio
course, that steam entered the
under the stopper D and conde
water thus formed falling throug
and displacing it. The displaced
flowed into the steam pipe. The s
taken from a flash boiler suppl
water from the town mains. In
insure the boiler not flooding, it w
sary to restrict the steam exit, and
done by fitting the steam pipe G
with a cap H, having a hole I dril
end. This cap was not screwed c
and to the writer's surprise every
oil fed into the steam pipe
through a small leak at J and nc
ever from I. Incidentally it may
tioned that the lubricator illus
Fig. 3 would feed sixteen drops
minute bare and four drops per
the part D was wrapped around
This gives a ready means of regu
flow of oil from a displacement l
All that is necessary is to have a
cap made lined with felt and arr
fit tightly over the lubricator, s
may be slipped up and down. T
up it is and the more of the lubr
posed the faster the latter will fe

Some time since complaints w
that a certain displacement
would not work. It would work
the oil was gone and then st
writer gave one reason for this
begs to offer another. The firs
which may have influenced the ac
follows: A lubricator such as
scribed will be quite cold at the b
and hot at the top. If, therefor
or semi-solid oil is used, a poin

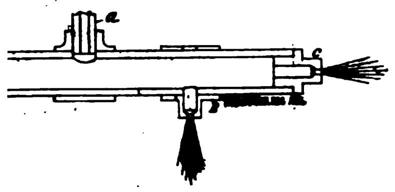


FIG. 5.

inside the lubricator where the oil o longer be melted. Now water will nk through a solid oil, and in conse- : the surface of the solid oil will act bottom of the lubricator, and the lat- ll only empty itself to that point.

ther reason is as follows: All the which enters the lubricator is con- l, but none of the air. Now the always contains some air and all this ollect in the lubricator, so that in cushion of air will be formed in the which will effectually prevent its ac- This will be obviated by having the itor very near the steam pipe, so that ent of steam will be kept playing inside the lubricator.

irning again to the question of the introduction of the oil into the cyl- when the writer first published the entioned above with reference to Fig. Veich Wilson, lubricating expert to ı. Price, stated that it was a common rity of oils, and that to get good re- be oil should be fed into the middle steam pipe, so that it could not run the bottom. To test this the writer the arrangement shown in Figs. 5 A is the stem of a Lunkenheimer tor, terminating in the middle of the pipe, through which steam was flow- the two nozzles B and C. It was in this case that Mr. Wilson was ly right, and that the oil issued r from both B and C. It was then d to try the effect of a bend beyond int of introduction of the oil, it be- ought possible that all the oil would wn against the pipe walls and adhere Fig. 6 proved that this was not the s equal quantities of oil came ont of zzle B and nozzle C. The same re- rere obtained with the nozzle B di- vertically upward.

tly after the first publication of the facts a writer in the London *En-* said that he could bear out both Mr. Wilson and myself, but he pointed it it by no means followed that be- ou got the steam impermeated with t you lubricated your cylinders when g with superheated steam. His e said, had been using superheated in marine engines and had met with iculties experienced by the writer in an even distribution of oil. They ien tried impermeation, and though und that they could get oily steam ny part of the engines, they were not ing their cylinders and valves. They eventually that the only reliable way feed the lubricant to the cylinder hemselves as is done in a gas engine. The writer is of the opinion that this should always be done where possible, and if it is, the property of oil of not mixing with the steam may be taken advantage of to separate the oil from the exhaust steam.

GRAPHITE.

This lubricant has the advantage that it is not affected by the heat of the steam, but it is not at all easy to feed properly to the cylinders. If it be fed into the steam pipe it is very likely that it will all lodge in a little pile just where it is introduced, especially if there is any oil in the steam. It cannot be fed mixed with oil, at least not in considerable quantities, from a displacement lubricator, as the graphite falls to the bottom of the oil and the water which condenses will not fall through the graphite, so that the latter is left behind in the lubricator. It is probable that the best way is to feed this lubricant also direct into the cylinders to be lubricated in

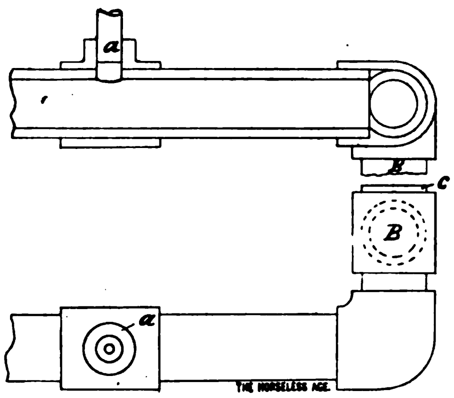


FIG. 6.

any convenient way. The Lunkenheimer Company make a sight feed lubricator for graphite which works well with flake graphite, but, the writer believes, will not work with very fine graphite. It is probable that this lubricator would also feed flake mica. This is a first class lubricant for cylinders if carefully prepared. It should, of course, be hardly necessary to point out that only the very best graphite or mica can be used for lubrication. Most natural graphite has some grit in its impurities which would rapidly ruin a cylinder. The only graphite known to the writer which can be safely recommended for the purpose is Dixon's. The writer had some of this tested by fire, and after the carbon had burned off the residue seemed to consist of mica. This, as has been said, has considerable lubricating properties of its own, so that the combination can but be good.

THE SEPARATION OF THE OIL FROM THE EXHAUST.

A by no means inconsiderable part of the problem of lubrication of cylinders where a condenser is used is the difficulty of getting the oil out of the exhaust. It may at once be said that so far as is known to the writer there is no means which could be utilized on an automobile that takes all the oil out, but it is possible to remove all the oil which finds its way into the ex-

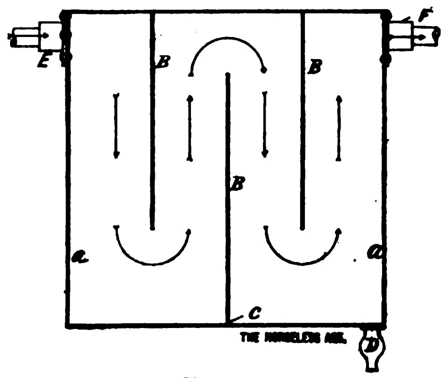


FIG. 7.

haust in considerable drops. The oil in a fine state of division, which shows as a white coloration in the water, can only be removed chemically, as by forming a chalk precipitate in the water, when the oil will be carried down with the precipitate, it is said; or, by the use of a cream separator, such as is used in dairies.

Very simple means will separate out the greater part of the oil in the exhaust, and Fig. 7 illustrates as simple a method as any. This arrangement was tried in the exhaust of an engine being flooded with oil, and only the oil in a fine state of division found its way through the condenser. A A is a rectangular box of sheet metal about 2 inches deep and about 8 inches square. Into the 2 inch side the exhaust steam enters, striking the baffle plate B and passing through between the other baffle plates to the outlet at F. The oil collects on the baffles and runs down through the drain pipe D. A small hole is left at the base of the middle baffle at C to allow the oil collecting on the first baffle to drain away.

In conclusion the writer would caution all users of steam and internal combustion engines to be most careful of the lubrication. Nothing but the finest and best hydrocarbon lubricants should be used, or those prepared by first class chemists, and under no circumstances let the local tradesman impose on you with an "A1 oil for cylinders," of which he knows nothing but the price and the color of the tin.

A Suggestion for a New System of Ignition.

BY C. C. BRAMWELL.

The jump spark method of igniting the combustible mixture in an explosion engine cylinder has one cardinal advantage over the touch spark, or low tension system, viz., the suppression of the movable electrode inside the cylinder. On the other hand, the touch spark has two great advantages over the jump spark—low voltage and absence of the interrupter or buzzer. The first of these advantages (low voltage) is an advantage, inasmuch as it allows of more careless or bungling work. The necessity of high voltage is not a fundamental fault, for in properly insulated and protected installations the high voltage gives no more trouble than a low one. The writer has never seen a jump spark outfit properly ap-

plied on any self propelled vehicle as yet. But when it is properly applied the many troubles now traceable to the high voltage will disappear.

With the interrupter, or buzzer, the case is different. Here trouble will always be found. The adjustments must be delicate and the moving parts necessarily light, to obtain the high speed of vibration necessary. Careful workmanship will render these troubles less, but it cannot eradicate them. In other words, the necessity of obtaining an intermittent primary current is the fundamental fault with the present jump spark arrangement.

Now, the question is are we obtaining our interrupted primary current in the best way? I think we are not. I have thought so for over a year and have made several inquiries of manufacturers with regard to supplying me with the necessary apparatus to try a system entirely different from that at present in use; but I have made little headway, as no one seems to be able to handle the problem. Not being able to buy suitable material, and not having the time at present to make it, I propose to outline the method for discussion.

AN ALTERNATING CURRENT JUMP SPARK SYSTEM.

It is well known that an alternating current of proper period is as suitable for the purpose of exciting a jump spark coil (or transformer) as in an interrupted direct current. Why, then, do we not use an alternating current generator (thus doing away with the troublesome commutator on the direct current generators) and a plain coil without vibrator? A coil having a closed magnetic circuit would no doubt be better than the regulation jump spark coil.

With the above outlined systems we have all the advantages of a jump spark, with generator, but we get rid of two grave sources of trouble now existing, viz., the commutator and buzzer. A plain alternator with simple collector and good sized brushes connected up permanently and a closed magnetic circuit transformer, would make an ideal system of ignition. The alternator might be driven through a governor, and thus give ample current for starting, no batteries being used.

This proposed system is nothing more or less than the application of the latest practice in high tension electric work to motor ignition. I do not see anything to interfere with its being a great success for such purposes. What is wanted is a good alternator and a good transformer giving about 30,000 volts.

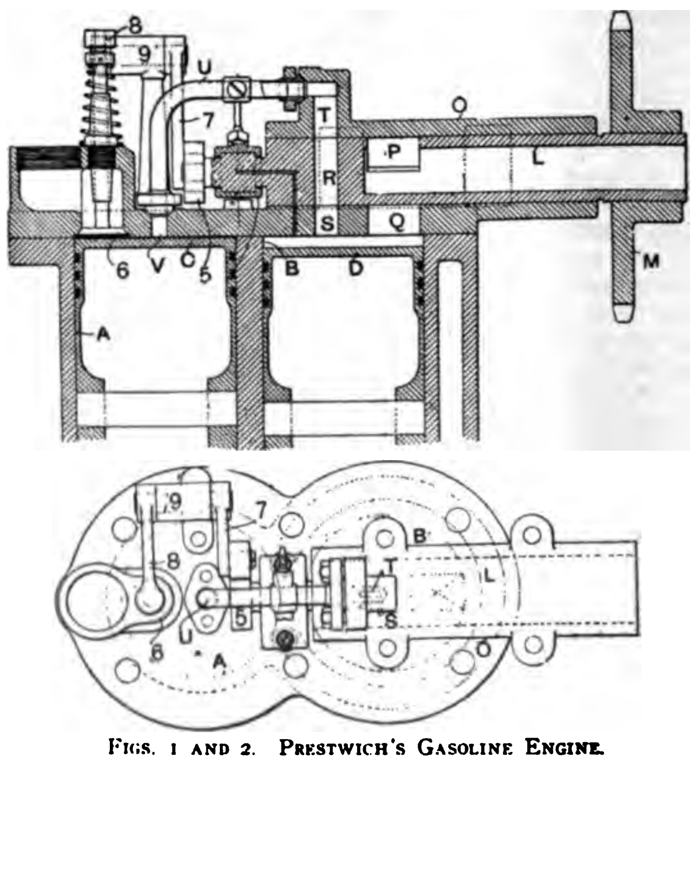
Let us have the opinions of others on this matter, for it is worthy of much thought and would richly reward the manufacturer who would put the proper combination on the market. An alternating current generator with a hollow base, into which the transformer might be placed, connected up and hermetically sealed by filling with boiling paraffine, would seem to be the proper caper.

I would suggest a multipolar type of generator, with large diameter armature, so as to obtain as sharp a curve from peak to peak of alternation as possible. The sharper the curve the better the coil will act. A high period of alternation would seem to be better than a slow one, provided the iron in the transformer was carefully selected. The transformer should also be of sufficient size to allow the secondary winding to be near the iron core, thus obtaining the greatest induction effect from the demagnetization.

Some Recent Gasoline Engine Inventions.

An English patent has recently been issued to John Prestwich, of Tottenham, London, for a new form of internal combustion engine "for propelling vehicles." The object of the invention is stated to be to eliminate some of the disadvantages of the Otto cycle. For instance, there is a limit to the pressure of compression in the Otto cycle owing to the liability of premature explosion by contact with the hot cylinder. The control of the ignition is also a difficult matter in small engines, unless accomplished electrically, which adds complications. To overcome these difficulties two cylinders are used, fitted with pistons and connected to the crank shaft by connecting rods in the usual manner. One is used to compress the charge, and this cylinder is kept cool, so as not to heat the incoming mixture; the second is the working cylinder, in which combustion and expansion take place. The cranks are so set that one piston travels slightly in advance of the other, according to the pressure of compression required. Valves are provided for the admission of air to the compressing cylinder and to open communication between the two cylinders when the compression has reached the desired pressure, and the contents of the compressing cylinder are forced directly into the working cylinder, near the dead centre, without passing into a receiver. The working of this cycle oil engine is as follows: Air is drawn into the compressing cylinder on the outward strokes of the piston and compressed on the inward strokes. As soon as the desired pressure of compression is reached, communication is made between the two cylinders. It is arranged so that the working piston is now about at its inner dead point. On further travel of the pistons, the compressed air is forced directly into the working cylinder, and the communication between the cylinders is then closed. Just before, during, or just after the air is forced into the working cylinder, a correct quantity of petroleum or petroleum spirit is forced or sprayed into the working cylinder or the port which communicates between the two cylinders; the air being heated by the compression and with contact with the hot working cylinder causes the oil to vaporize, and, if the working cylinder be hot enough and the compression high enough, will cause the mixture to ignite. The exploding mixture expands in the working cylinder during the outward stroke, and on the inward stroke the products of combustion are expelled through an exhaust valve provided for the purpose. Thus any degree of compression can be attained without the liability of premature ignition, the air does not come in contact with heated surfaces before or during compression, and the working cylinder can be comparatively hot, so as not to cool the expanding gases.

Referring to Figs. 1 and 2, A and B are two cylinders. The cylinder B, which is used to compress the charge of air, is kept



FIGS. 1 AND 2. PRESTWICH'S GASOLINE ENGINE.

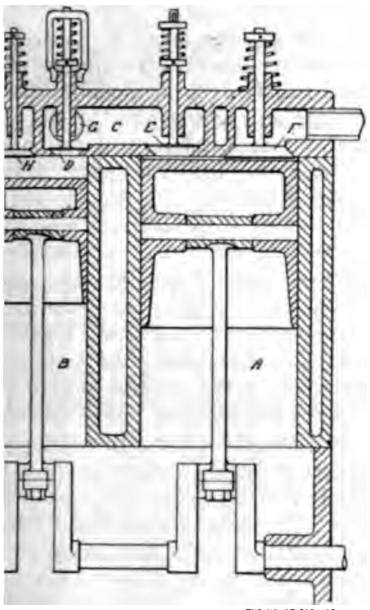


FIG. 3.

a water jacket. A is a working
in which combustion and expan-
a place. The crank of the cylinder
he crank of the cylinder B are so
the piston C travels slightly in ad-
f the piston D, the distance apart
termined by the pressure of com-
required. The valves provided
rolling the admission, exhaust, and
cting devices comprise a main
alve L in the form of a hollow
n at one end, rotated by a chain
l driven from the crank shaft at a
speed. The valve rotates in a suit-
ring or casing O, and has a port
ed to open and close communica-
ween its hollow part and the com-
cylinder B by a port Q; the valve
as a through port R opening com-
on at the proper time between a
n the compression cylinder and a
T leading by a pipe U and a port
working cylinder A. The rotary
o serves by a further extension in
of a lever 5 to actuate the ex-
alve 6 of the working cylinder
the connecting levers 7 and 8 piv-
the bearing 9.

3 shows an engine designed on
at similar lines, recently patented
iam A. Leonard, of Wareham,
This engine has two cylinders, a
linder A and a compression cylin-
The two cylinders communicate
ch other through the ignition
C, the automatic valve D and the
or mechanically operated, valve
n the piston in the power cylinder
s the end of its inward stroke
E between the ignition chamber
power cylinder is opened, and the
of gas is exploded by suitable ig-
levices, the power piston being
forward as usual. The ignition
has an automatic scavenging
adapted to admit fresh air to the
, and the size of the power cylin-
proportioned relative to the size
ignition chamber that after the power piston has traveled the major portion of its stroke the ignited gases in the power cylinder have expanded to atmospheric pressure, and during the remainder of the stroke a partial vacuum is created in the ignition chamber and power cylinder and a scavenging charge of fresh air is sucked or drawn through the scavenging valve, the said charge of fresh air driving before it and expelling from the ignition chamber into the cylinder all burned gases. As the power piston reaches the end of its outward stroke the inlet valve between the ignition chamber and the power cylinder is closed and the exhaust valve F opened, whereby the power piston during its inward stroke expels the burned gases.

The charge is drawn into the pump cylinder through the inlet valve H. The pump piston is operated by a crank on the main shaft, which is set slightly in advance of the main crank.

A novel method of scavenging the ignition chamber is employed. The scavenging is done by a charge of fresh air, which is drawn into the ignition chamber by the action of the power piston as it reaches the end of its outward stroke, the drawing in of the charge of fresh air driving the burned gases in the ignition chamber into the cylinder, from which they are expelled by the inward stroke of the piston. The ignition chamber is therefore left filled with fresh air only, and the drawing in of the scavenging charge of air operates to cool the ignition chamber, so that when the next charge of combustible gas is forced into the chamber the dangers of premature explosions are almost entirely avoided.

The operation of the engine is as follows: On the outward stroke of the pump piston it draws in an explosive charge through the automatic intake valve H. On the inward stroke of this piston this charge is compressed in the pump cylinder, and when the pressure in the pump cylinder on the valve D exceeds the pressure of the spring on that valve, the valve opens and the charge is forced into the ignition chamber C, the piston moving close up to the cylinder head. When the piston reaches the dead centre valve D automatically closes. A short time later (after an angular motion of the crank shaft of about 25 degrees) the power piston comes to the outward dead centre and the valve E is then opened by the valve mechanism and the charge in the ignition chamber exploded. During the outward stroke the burning gases expand to slightly below atmospheric pressure, this end being attained by making the power cylinder sufficiently larger than the pump cylinder. The valve E is held open all the while, and as soon as the pressure in the power cylinder descends below atmospheric the scavenging valve G is opened by the suction and pure air is drawn into the ignition chamber forcing the products of combustion therefrom into the power cylinder. When the power piston reaches the outward dead centre both the valves E and G are closed and the exhaust valve F is opened, and during the next stroke the burnt gases are expelled from the power cylinder.

The valve operating mechanism and details of the valves are not shown.

The inventor claims the following advantages for this type of engine:

The initial charge of gas and air is not preheated or expanded before compression, since it is drawn into the pump cylinder, which is absolutely free from hot burnt gases and has walls only slightly heated by the compression of the previous charge, thus securing a maximum charge for compression. This charge is equal to the cubic capacity of the pump and compression chamber combined. The ignited charge is expanded to atmospheric pressure before release, thus securing an increase in efficiency and a practically noiseless exhaust. The combustion chamber is scavenged by pure air and the burnt gases are expelled from the cylinder by the piston. As a result the dilution of the incoming charge with hot burnt gases is avoided and high compression can be obtained without danger of premature ignition.

Present Status of Automobile Patent Litigation.

THE SELDEN PATENT.

Suit is now pending between the Electric Vehicle Company, the owners of the patent, against the Winton Motor Carriage Company. This is merely a test suit, since the Electric Vehicle Company maintains that other manufacturers of gasoline automobiles are infringing their patent.

Betts, Betts, Sheffield & Betts, counsel for the complainants, say they have served notice of infringement upon all manufacturers of gasoline carriages, so as to be prepared to bring other suits, should they succeed in sustaining the patent.

Testimony for the complainants was completed about a year ago. Kenyon & Kenyon, counsel for the Winton Motor Carriage Company, inform us that they have nearly completed the taking of their testimony, the limit of their time for so doing being October 15. The complainants will then take their rebuttal testimony, and as this will occupy some time, the case cannot go to hearing for some months to come.

GRANT TIRE PATENT.

The adverse decision rendered against this patent by the Circuit Court of Appeals, of Cincinnati, in the suit between the Consolidated Rubber Tire Company, the owners of the patent, and the Goodyear Tire and Rubber Company will, we are given to understand, be referred to the Supreme Court of the United States under a writ of certiorari. Such writ has been prepared and will in all probability be presented to the Supreme Court of the United States in October.

The Consolidated Rubber Tire Company believe their petition to the Supreme

Court to be based upon a just foundation, because their patent has been sustained in all previous suits in the United States, as well as in France and Mexico; and because the adverse decision rendered by the Cincinnati court was based upon a new proposition, namely the degree of tension to which the retaining wires should be subjected in the implacement of the tire in its channel.

WHITNEY PATENT NO. 652,941, DATED JULY 3, 1900.

Suits are now pending between the Whitney Wagon Company, the owners of the above patent, against the Stanley Brothers, of Newton, Mass.; the White Sewing Machine Company, of Cleveland, Ohio, and New York city, and the Foster Automobile Company, of Rochester, N. Y.

Suit under this same patent was also pending against the Milwaukee Automobile Company at the time the latter was forced into the receiver's hands.

F. L. Emory, counsel for the Locomobile Company, who control the Whitney Wagon Company, makes the assertion that the above patent covers practically all steam automobiles made at the present time.

It cannot be gathered as to when hearings in the above suits may be expected.

UPTON CHANGE GEAR PATENTS.

T. F. Bourne, counsel for the Upton Machine Company, informs us that no suits have yet been brought by his clients against the alleged infringers, upon whom notices of infringement were served some months ago.

THE G. & F. TIRE COMPANY VS. THE DIAMOND RUBBER COMPANY.

This is a suit under the Jeffery patent, of June 16, 1891, with the subsequent Jeffery patents dated January 5, 1892, January 12, 1892, July 17, 1894, and April 28, 1896, coupled with the patent of William Golding, of Manchester, England, of March 7, 1893. The plaintiff's means for attaching and detaching a tire from its rim, namely, the provision of beaded edges, which engage a rim shaped to receive them, the air pressure holding the connection securely without cement or other fastenings, is the subject of this present suit, which may be said to be a test case.

The papers in the case are dated August 28, 1902, being returnable on the first Monday in October, in the Circuit Court of the United States, Southern District of New York.

Arthur Herschmann, mechanical engineer of the Adams Express Company, sails for Europe October 1 to inspect the latest foreign models in steam wagon engineering and to visit the Mytholm Steam Wagon Company, of Yorkshire, England, and the Hungarian Wagon Company, Limited, of Roab, Hungary, licensees under the Herschmann patents. O- ' ' --turn, the American Steam ly, organized last erations here.

BEGINNERS PAGE.

The Flash Boiler.

While fire tube and water tube boilers are essentially similar in their behavior in use, flash boilers are entirely different. The main reason for the different behavior of the latter class of boiler is that it contains almost no water. The average fire tube boiler has such a water capacity that if, when the water level was normal, the feed was shut off and the generation and use of steam continued at the regular rate it would take about fifteen minutes to evaporate all the water in the boiler. In a flash boiler this stage would be reached in a few minutes and even less, according to the particular construction. The hot water in the fire or water tube boiler represents a certain amount of stored energy which can be drawn upon in exceptionally difficult places, in mounting grades, etc. This store of energy is very much smaller in flash boilers, and in some types is practically nil. Besides the ability to temporarily increase the rate of mechanical power generation this store of energy offers the further advantage that while the carriage is standing and the feed pumps are at rest (there being in a steam carriage no disconnecting clutch between the engine and the driving wheels and the pump being driven by the engine) steam can be drawn from the boiler for filling the water tank by means of a water lifter or steam ejector. With a flash boiler carriage this is impossible. Another consequence of the small water capacity of flash boilers is that the steam pressure varies greatly and abruptly, whereas this pressure varies only slightly and gradually in fire and water tube boilers, in normal operation. Still another feature of flash boilers is that as the water flashes into steam there is no "water level," and hence no water gauge is required to indicate it.

It will further be readily understood that as there is an extremely small amount of water in the flash boiler the feed must at all times be very closely regulated in proportion to the steam consumption. Hand regulation is therefore impossible and automatic regulation the only practical method.

Considerably higher pressures are employed in flash boilers than in the other types, and the steam is always superheated. In order to be able to store up some energy in the form of heat, to prevent too great variations in the temperature of the steam and also to prevent a too rapid destruction of the generator tubes, the latter are made with much thicker walls than the tubes of other forms of boilers.

At present there are only two designs of flash boilers in extensive use on automobiles, one of these being manufactured in Europe and the other in America. consist of superposed coils of pip nected so as to form a continuous passage for the water and steam; bu is an essential difference between tl in that in the European desig water is fed into the lowest and coil and the steam issues at the end upper coil, whereas in the Americ sign the water is fed into the upp which is the coolest, and issues at t of the bottom coil, which is right o fire. There are other differences b these two types, as will appear fr detailed descriptions which follow.

Fig. 1 represents the European (F design of flash boiler above referred illustration being an elevation in h tion. The horizontal section of this is square, which point has probabl determined by the shape of the pa form of burner employed with the The sections or superposed coils a all alike. The lowest coil A fc square helix and constitutes a wall combustion chamber. Above this th a number of similar sections B. ends of these sections are on th side; the tube extends across the running back and forth and havin short bends. Each section is comp two layers, every part of each laye in the same plane and the whole composed of a single continuous p pipe. The various similar sections group are connected up so that tubes are parallel and not crossing. this group there are a number o similar sections C. Each of these also of a continuous length of pip back and forth and arranged in two but the form in which the pipe is b is quite different from that in sect Instead of being bent short, the bent in a curve of considerable rad the tubes of one layer cross the t the other. The pipes employed in tl struction of the sections of the d groups differ from each other in the ness of their walls. The pipe of se is very heavily walled; the pipe of s B is not quite so heavy walled, and tl of the sections C has the thinnest wall various sections are connected t other by short connecting pieces ar unions outside the furnace space, the heat cannot affect the joints. T tire boiler is inclosed in a sheet casing lagged with asbestos.

As already stated, the water is p into the boiler at the lowest secti steam issues on top. The water is into steam as soon as it reaches hot sections B and in the sections steam is superheated.

In Fig. 2 is illustrated the Ameri sign of flash boiler above referred t in elevation and half section. The s of this boiler are similar in sha differ in the material employed thickness of walls. Each section of a flat spiral coil of tube and a

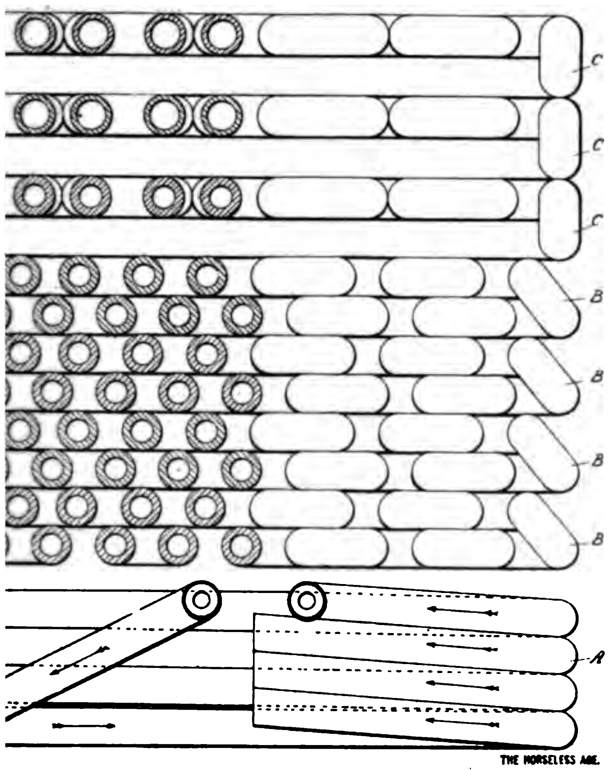


Fig. 1.

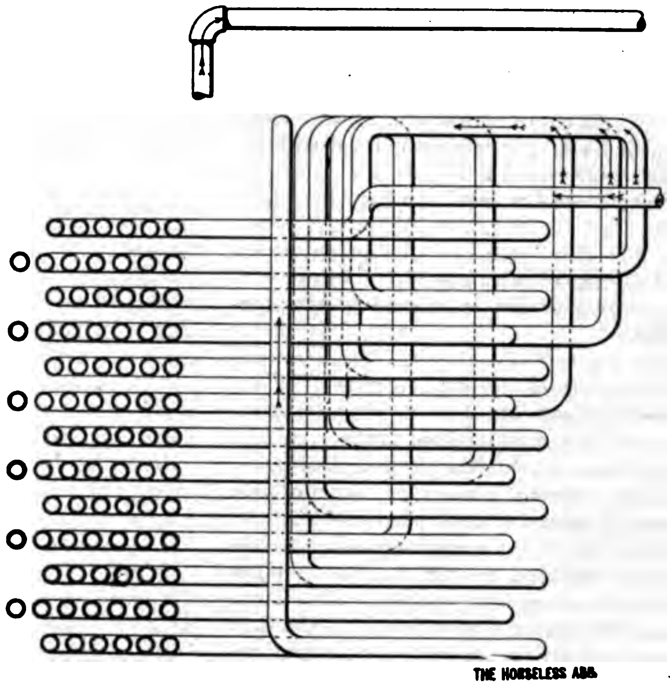


Fig. 2.

; have thin spacers between them. it coils are connected to each other, directly. The outer and inner ends section or coil are carried upward op of the boiler and there the outer any one coil connects with the in-1 of the one below (except, of as regards the lowest coil) by a tally disposed radial pipe and elbow The connections are not shown llustration, which is only diagram- The effect of this method of con- the sections is that the water, nters at the top coil, can reach the coil only by being forced through er by means of the pump and is not to flow through it by gravity.

s boiler the upper sections serve as ieating coils; the water is changed n somewhere near the middle of the the exact point varying, of course, rably under the varying conditions 1 consumption, feed, fire, etc. The sections serve to superheat the This boiler, therefore, ordinarily s an amount of water equal to the of several sections, and the manu-s therefore refer to it as a semi-iler.

boiler, too, is inclosed in a sheet ase with asbestos lagging.

A Frank Admission.

ther we approach the subject from y draught or the rapid vehicle point, or threatens the horse. It is no urke the subject: we have to face had better try to learn the worst pt ourselves to the times. We must e be left behind."—*The Farmer and reeder.*

LESSONS OF THE ∴ ROAD ∴

1,300 Miles in a Gasoline Touring Car

By W. W. M.

It has occurred to me that it would be in line with the object of the New York-Boston contest and the suggestions of Mr. Duryea in his various articles concerning a reliability contest to relate briefly my experience and observations resulting from about 1,300 miles of country road riding in a gasoline touring car.

This car was received by me from the agent April 24, 1902. Some days previous the carriage had been delivered to the agent by the manufacturers, but upon a test run it was found to have developed some fault, and, it was also found to be impossible to correct it, therefore the factory sent an expert to look over the machine. It was discovered that in casting the balance wheel a poor casting had been made and a porous part was located at the point where the main shaft goes through the balance wheel. In cutting the key seat it so happened that it was cut at this particular point. In running the machine the weakness was not developed in the first place, but by the time it had been run a little ways the porous casting began to crumble and the balance wheel loosened from the main shaft. It was found necessary to take out this wheel, send it back and have it replaced with a new one. This is one of the advantages of purchasing a machine through a local agency, who give it the care they would give one of their own machines, and in doing so developed this trouble, which later might have been very serious for an inexperienced purchaser. An operator was furnished to accompany me home with the car, and we arrived in the afternoon, after making a trip of 68 miles through some sand, but over otherwise good roads, with but three stops, two of them voluntary. One stop was for dinner, and while we were at dinner some of the boys among the observers amused themselves by writing their initials in the dust on the highly polished woodwork of the car. The one involuntary stop was the result of skidding into a ditch from the top of a freshly graveled pike road. Many of the roads in this vicinity are rounded up so that it is quite a feat of balancing to drive along the top at any speed. In this case the gravel was so soft that the weight of the machine crumbled one side of the track away, and in order to get back on the road it was necessary to tighten the low speed clutch and back further into the ditch, so as to get a start. This was the only time on the entire trip that I used the low speed, having come through several miles of deep sand on the high gear, and over sand which a year before stalled me in a two seated steamer.

The roads in Northern Ohio and Indiana, where I have done most of my driving, are uniformly quite good. There are but few hills, and on my numerous trips, usually with three other passengers, I have found myself able to climb all hills on the high gear. The steepest hill in this vicinity is 16 per cent., and I have frequently climbed it on the high gear with four passengers, all of them in the 200 pound class as to weight without any trouble.

The method of control of speed on the

machine seems to me ideal. The carriage responds as quickly as a steam carriage and in a very similar manner. I seldom use the low gear, except for starting the machine. On one or two occasions when in deep sand or mud I have been compelled to run on the low speed, but largely as a matter of protection, as the speed which I might have accomplished with the high gear would have been too great for me to control in mud. In speaking of the car I feel that it can be said that it is uniformly good, and in mentioning a few of the faults I have observed I do not wish to be considered as criticising unreasonably.

In the first place I found the steel tube running from the steering wheel to the floor so light that it bent. This I had replaced by a solid steel bar of the same size, which has never given me any trouble.

The tonneau was very uncomfortable. This I knew before I purchased the machine, and I made arrangements with the agent who sold me the machine to allow me a certain amount for altering it. I had the back extended up 5½ inches; the door extended up to the same height and upholstered, and a movable seat placed between the two permanent seats. This makes one continuous seat across the back, and the back seat is now, if anything, more comfortable than the front, and the change has certainly added much to the appearance of the carriage.

WEAK SPRINGS.

The springs I regard as the weakest point in the entire construction. I have broken them several times and there seems to be no spring in them. It is only with a very heavy load that one gets any effect out of them. The car rides almost as comfortably after they are broken as before. I think a full elliptical spring would be a marked improvement and that it should be at least 40 inches long. However, my experience has been limited; but I know that the full elliptical spring on the steam carriage which I owned has frequently been bent until the springs came together without breaking, and when riding at the same rate of speed the carriage was much more comfortable.

There has been but little trouble with the spark plugs; they have worked well uniformly. I ran my machine over 400 miles without giving them any attention whatever. The trouble I have had has been with the circuit breaker. It has required frequent adjustment and is constantly becoming covered with oil which leaks out around the shaft. I think that this feature of the car can be greatly improved. However, I recently met an owner of another car like mine who stated that in 800 miles he had adjusted his circuit breaker but twice. Most of my trips have been to points not more than 60 miles distant from this town, and frequently I have made the entire trip without any involuntary stops. [illegible] I went through to Fo[illegible] distance of 45 miles, in two hours and eight minutes without a stop. The roads were somewhat improved the following day, and I was returning at a speed that would have resulted in the entire trip being made in less than two hours. I had made the first 19 miles in thirty-eight minutes when a tire burst, and the result was that the balance of the trip was made on

A ROPE TIRE.

I do not know whether a rope tire is new to automobile owners or not, but it worked so well that I believe it is worth mentioning. I took off the tire after it burst and inside of the rim placed two 1 inch ropes; this nicely filled the space in the rim. On the outside of this I placed a 1¼ inch rope, being careful that I cut the rope the exact length to reach around the wheel, and wired this on with hay baling wire. The wire would last for about 10 miles, and I ran along at a speed of from 8 to 10 miles an hour.

GASKETS BLOW OUT.

Between the upper and lower halves of the crank case a rubber gasket is fitted in so as to make the crank case oil and air tight. I have had much trouble with this gasket blowing out, and when it does blow out the noise of the engine is increased to a remarkable degree. The cases were not fitted properly, and although I have taken sheet lead and attempted to fill up the space so that the bearing would be the same all the way round I have not succeeded in doing so. I have used four gaskets in this attempt, but without success as yet.

THE "SUN" GASOLINE.

The car ran 1,000 miles with practically no adjustment, and the only serious trouble was due to getting an inferior grade of gasoline. I am now using the stove gasoline manufactured and sold by the Sun Oil Company, of Toledo, and although it costs less than the Standard Oil Company's gasoline it gives me much better results.

At the end of 1,000 miles, like "the one horse shay," there seemed to be many difficulties arise. The wiring gave out; I found that the wire had broken off in several places from vibration, so that there was a very poor contact; the batteries became exhausted at this time. I should have foreseen this, and at the end of 800 miles I shall replace the present batteries. The pneumatic speed control failed to work and the engine could not be slowed down. It would run at a high speed and the fault seemed to be in the pump. I had the entire machine overhauled and repaired where necessary at an expense of over $30, and the car now runs as well as ever.

THE HORSELESS FEATURE.

One of the most charming features of the car is the fact that it can be operated at a low speed with practically no noise and but little vibration, and on good roads I can ride behind a walking horse, on high gear and with so little noise that the driver of the horse will not notice me. This is certainly remarkable when compared to the high speed motors when operating at low speed. It is not [illegible] pleasure but a marked economy [illegible] consumption of gasoline. I find t[illegible] maker's estimate of 150 miles on [illegible] lons of gasoline is fully upheld b[illegible] rience. I can make that distance w[illegible] passengers on good roads witho[illegible] especial attempt at economy.

The muffler is very effective as t[illegible] but I believe it develops a good [illegible] back pressure. There seems to b[illegible] one-third more power when the [illegible] is cut out; that is, the car respond[illegible] quicker. I have never given it a tr[illegible] a measured distance with the sam[illegible] so may be wrong in my estimate. four passengers and full tanks I ha[illegible] a mile in 100 seconds with the mu[illegible] out, but without any preliminary p[illegible] tions. This was on a mile track an[illegible] out advancing the spark. I tried [illegible] ond mile with the spark advanc[illegible] made exactly the same time, whic[illegible] indicate that advancing the spark [illegible] little effect in this particular engine

The oiling device has been highl[illegible] factory in my case, and is automa[illegible] cept that it has to be turned on w[illegible] carriage starts. The wheels, gear a[illegible] and differential are the only parts [illegible] are not oiled from a single tank.

A DRESS PROTECTOR.

When the car was received there [illegible] opening in the floor of the t[illegible] through which a part of the brake [illegible] tions extended. Through this ope[illegible] grease and dirt would come, and [illegible] dress was sure to be spoiled. A sm[illegible] was made to cover this, and it tho[illegible] protects the occupants without int[illegible] with the brake mechanism. This [illegible] have been done when the car was [illegible]

I find the weight with tanks fille[illegible] distributed as follows: Front whe[illegible] pounds; rear wheels, 1,320 pounds [illegible] 2,260 pounds.

The Item of Tires.

By Dr. Daniel Longaker.

In a special contribution some [illegible] ago the writer came to the conclusi[illegible] pneumatics, while expensive, we[illegible] necessary, and he was led to estim[illegible] cost of keeping his heavy car shod [illegible] a year, using it on an average of 7[illegible] a month.

Looking at my statement of exp[illegible] the last issue the figures there give[illegible] to show that I overestimated the [illegible] since $166 for two years would [illegible] $88 per annum. I will, however, s[illegible] a few moments how grossly under[illegible] tual cost this is. It is one of those i[illegible] in which figures lie.

In the first place, it must be reme[illegible] that the traction or rear tires whic[illegible] most of the load were often suspen[illegible] at rest for days at a time and gave [illegible] actually much less than the period [illegible] years.

More important far than this [illegible] very liberal construction of the tir[illegible]

er's guarantee. But for this and the liberal use of ink and forcible English my tire bill would have been more than double the amount named.

The account would actually stand like this:

August, 1900, one new 3x32 in. tire	$24.00
September, 1900, two new 4x36 in. tires	82.00
April, 1901, two new 4x36 in. tires	82.00
Total	$188.00

Thus $188 should be added to the amount given, making $354.06. But this fails to tell the full truth, startling as the figures may appear. One of the wheels is ready for a new tire and another soon will be. Remember, this was a brand new machine, spick and span tires, never had rolled a mile when it came to me. No doubt the tire makers, better than anyone else and long before the rest of us, realized the difficulties of the problem, and the price charged is perhaps the best evidence of this.

The truth is, those of us who kicked hard enough got something on which we could keep our cars running at a cost not entirely prohibitory and the rest paid the bill. But is this fair? Can we expect such a condition to continue much longer?

An observation made only the other day, however, shows that the same tactics are still resorted to by those who find themselves in this dilemma. Looking at a touring car equipped with 4 inch pneumatic clinchers (car for sale) I noticed that all the tires, front as well as rear, were badly worn, although the vehicle had been used but a month.

The man who was trying to do the selling, having dilated on the wonderful points of the car (it would last a man a lifetime, so well built and stanch was it) came finally to the tires. Yes, they were bad; but those were some of the first turned out by that company and I was assured that they would be replaced by new and better ones. They made the tires much better now. Leaning over I wiped the dust off the odometer (in working order) and read 1,730 miles. It need not be a matter of surprise that these tires were worn out after traveling less than 2,000 miles. But the motto still seems to be, kick hard and get new ones. This is not fair; it is not business and it will not continue, save in exceptional instances. The item of tire expense, therefore, should be $354.06 and not $166.06.

On a car weighing nearly a ton, and driven 25 miles daily over car tracks, rubble pavements and all sorts of roads, winter and summer, a liberal estimate would be 50 cents per diem for tires. This is not jugglery with figures, but the truth based on the market or selling value of the goods actually used in my own driving.

Writers in THE HORSELESS AGE have very aptly expressed their doubt if the automobile of ample proportions would have anything left to run on. If the expense were not more than $166 in two years we might continue to run heavy cars on pneumatics even on our business vehicles. But $355 in less than two years is a proposition staggering even to the millionaire. No automobile weighing nearly a ton can long be driven at 40 miles an hour on pneumatic rubber tires. It will kill them in a short time as they are at present made.

...COMMUNICATIONS...

Experience with Repairers.

Editor HORSELESS AGE:

I have read with much interest Mr. Haines' experience with repair sharks, as printed in your issue of September 17.

From the description given I can identify the first repair place mentioned. I had a similar experience there, but, the sum being small, I had not thought it necessary to make a contract in advance, hence I had no remedy but to avoid the place in future and to keep acquaintances away from it as far as possible.

If I may be allowed to say so, I think, however, Mr. Haines erred greatly in his handling of the matter. The manager's statement that the price had been given in haste and under the impression that the job would not take so long was an admission that a contract price had been agreed on.

Mr. Haines should, therefore, have tendered in the presence of a witness the $7 and demanded his carriage. If the demand was refused he should have gone to the nearest court or law office and proceeded against them upon the theory of a conversion of personal property. I think that he would have discovered that the manager would have come down as soon as he was satisfied that such a course would be taken.

With respect to the incident at New Brunswick, I can hardly agree with him. My own rule is either to help myself from a wayside pump, hydrant or brook, or else give 25 cents to anyone whom I may permit to fill the tank or to assist me to do so. The charge is not for the water, but for the time and the use of the facilities.

His experience on the sea coast is a very common one so far as the overcharge and the use of his machine are concerned, but it was a very unusual one in that he was able to discover that his machine was being used.

It seems to me that in this case, also, it was a duty he owed to fellow sportsmen to punish the delinquent more severely than he did. As the matter rested it is extremely probable that although the repair man lost his bill of $3.50 he received more than that sum for the hire of the machine, and was, therefore, in pocket by the transaction.

We all have ground for believing that our machines are at times used without our knowledge and any owner who catches the repair man in flagrante delicto should make him suffer severely in order to discourage the practice.

My own experience covers the use of five machines and it has left upon me the conviction that while there are a few repair men both competent and upright, they are, like gasoline depots in a hilly country, very few and hard to get to.

VIATOR.

Explosive Engine Queries.

Editor HORSELESS AGE:

The following questions, which I would ask you to be kind enough to answer, refer to a high speed air cooled motor (as yet imaginary), cylinder 2½x3, similar in design and construction to the general type of bicycle motor; workmanship to be first class in all respects, and special attention to be given to the fit of the piston and rings in order to prevent leakage.

1. What should be the capacity of the compression space?

2. What pressure will be attained by the compressed gas?

3. What will be the pressure at the moment of explosion, and also just before the opening of the exhaust valve at the end of the power stroke?

4. What will be the pressure on the piston at or near the end of the exhaust stroke? The muffler is supposed to be a good bicycle muffler.

5. What resistance is offered by the friction of the piston, in pounds, under fair average working conditions?

6. What would be gained or lost by using steel tubing for both cylinder and piston?

7. How would a cast steel piston work in a steel tube cylinder?

HOWARD GREENE.

[We know of no measurements of the pressure of explosion and exhaust in bicycle motors, but presuming the action in these motors to be about the same as that in larger motors running at slower speed, your queries might be answered as follows:

The compression space should be from one-third to one-half the displacement of the piston, giving a compression of 75 to 50 pounds gauge. We notice that some motors of this class are designed so that the piston comes practically to the end of the cylinder when in the inner dead centre, the compression space being formed by the head, which is semi-spherical, the radius being equal to half the cylinder bore, and the valve chamber and passage. The explosion pressure with 75 pounds compression may reach 300 pounds per square inch. The exhaust pressure will probably be about 50 pounds gauge. We do not know what will be the piston friction. We do not believe that a piston and cylinder, both of steel, would be satisfactory, as steel sliding on steel is likely to cut. Steel on

cast iron, however, is a good arrangement as regards the bearing qualities. Steel has a slightly higher coefficient of expansion than cast iron and it might therefore be best to make the cylinder of steel.

The statements in regard to the use of steel are merely opinions and are not based on experiments in this particular line. This field has either not yet been investigated or the results of investigations that have been made have been unsatisfactory and have led to nothing. Pennington, of course, used steel tubes, but with what success we can only surmise, for there are no Pennington machines around.—ED.]

Finds the Accident Column Useful.

Editor HORSELESS AGE:

I was very much pleased to read your editorial on automobile accidents in your paper of September 10. You can rest assured I am very much interested in reading up everything in this line. Everybody having an automobile should be taught all the dangers they have to contend with in running a machine. Nine out of ten accidents could be avoided if the public were better posted on the dangers of fast running, etc., and I think it would be a very good thing if all the dealers in automobiles would furnish instructions with every machine they sell, which would call attention to the dangers users are liable to run up against. I would not sell the information I have learned through reading your automobile accident articles for any price; it is invaluable.

Hoping that others of your readers feel the same as I do on the subject and that you will continue with your good work, I remain, MARTIN RUDY.

"Little or No Trouble" in 14,000 Miles.

Editor HORSELESS AGE:

It affords me great pleasure at this time to write you concerning the —— purchased by the —— Whiskey Company, of ——, N. Y. I have driven this machine 14,000 miles, having visited nearly every city and town in the State of Pennsylvania. There is no road too rough or hill too steep for it to travel. It has given me little or no trouble, the only actual expense being from punctured tires. This is being done away with to a certain extent with the later type of tires. The engine and boiler have never been removed from the carriage, and as far as I can see are in perfect order today. The burner is in excellent condition. Steam pressure is never below 200 pounds, and the engine runs as smoothly as when first purchased. I am not an expert chauffeur, still in this long run I never met with an accident. The carriage is easily controlled and can be brought to a stop on any part of a hill, either ascending or descending. I start on a 1,200 mile t--- -- October.

This le' unsolicited. I write it that brother chauffeurs may see what success I have had in long distance work with my machine. I would say that my weight is 261 pounds and I usually carry 200 pounds of advertising matter. E. F. WHITE.

[The dashes in the above communication are ours. We are pleased to see that at least one man has found the millennium in automobiles.—ED.]

"Some Recent 'Revolutionary' Automobile Inventions."

Editor HORSELESS AGE:

An editorial on the above subject which appeared in THE HORSELESS AGE for September 10 was undoubtedly justified by the particular cases cited, but why the writer should get "his hammer out" for all combination (gasoline-electric) machines is something I fail to understand, and would say that if you can find space in some future issue to give the advantages and disadvantages of this system more fully and in detail you will aid your readers in passing a verdict on what appears to the lay mind to be a practical and advantageous arrangement.

Electricity is acknowledged by the majority to be the ideal power for carriage propulsion, and if it were not for its very limited range, length of time required for charging and lack of stations on the road for recharging we would all look for an electric car.

The combination car seems to eliminate all these objections by providing a machine which is always ready, has the same range and is dependent on the same source of supply as the gasoline machine. Other advantages over the latter may be stated briefly by saying that they are the advantages of the electric over the gasoline.

Reports of tests of combination machines show a remarkable efficiency and low cost of operation comparing favorably with any other power. It is very possible that "hub motors" might not show a very good record—of that I know nothing. It seems, however, as if a compact generating set mounted on a properly constructed running gear and furnishing current to two efficient motors geared to the rear wheels would prove an ideal proposition. It is a simple evolution, the electric carriage grows from a part of the whole to the whole in itself. Why not? Compared with a gasoline machine of the same capacity would there be extra weight carried or space required? Not necessarily any of consequence, for while a dynamo is added it can be made to take the place of the flywheel and the motors that of clutches and speed changing and compensating gears. More complications? True, there are two powers, but as the engine is running constantly at the same speed it may be set to better advantage and made automatic, requiring no attention, while the electric part sir rather than complicates.

Loss of power? The engine r constantly under the most favorabl ditions should transmit more through the motors than it would tl the numerous gears required were alone.

Why, then, can't we have a m with the flexibility and ease of op of the electric combined with the reliability and cost of operation gasoline? Why?

JOS. S. CORTEI

[For reply see editorial columns.

Mr. Duryea's Comments

READING, PA., Septembe

Editor HORSELESS AGE:

I have just returned from a trip ton, where I took part in the Wheel the Hub, and find the last two is your esteemed paper awaiting me.

Before referring to same a comn the Boston event seems of value. lowed the route, the pace and the the original cyclers of 1879, and the ence in the matter of speed was p manifest. It is well known that tl cle is a great improvement over methods of travel in the matter o but I never realized so fully the p made by the bicycle and its succes motor vehicle, until I participated i which followed the pace origina Verily, the world does move.

Regarding the electric carriage, tl age of acid from the batteries, "creeping," fumes and cracked ce not only rotted the trays completely had rotted the floor of the vehicle, ing the sills, and rusted the iron plates on them so that it did not r heavy jolt to drop the bottom out, scribed. Further, the acid fumes h the oil cloth covering above the batt had attacked the painting, nickeli upholstering. If batteries could b without powerful acids or alkali would not be so objectionable, but as such liquids must be used in a except gas tight cases, I see no ho battery that a man wearing good can expect to take care of.

Regarding the emptying of the c makers' catalogue says, page 12: "T are shipped complete with the electr ready in them," and we are also c by some authorities not to leave t empty, but to refill with water if r electrolyte. Certain it is that I foll structions as closely as I could, and perience corresponded closely with a number of years' use of batteries tion purposes. At best it is a mos sive form of energy and very un The table given in your last issue Longaker, in which he shows the the batteries to have been more tl the cost of gasoline and nearly half of lubricating oil and gasoline t

covers the cost matter. Against this we offer the experience of users who have displaced three horses in their regular practice and "have not touched the magneto for ten months."

Regarding the deterioration of sparking points mentioned by Mr. Walton, it is likely that the dynamo is not properly wound for sparking, giving too large an amperage and too low a voltage, so that in order to get sufficient voltage it generates too much current. Running it slower will probably not remedy this defect.

There is such a thing as "negative back pressure," and the writer has operated stationary engines utilizing this principle, for which application for patent has been made. The escaping gases rush out with such force that they create a partial vacuum in the cylinder, which may be utilized to draw in several cylinder volumes of air at atmospheric pressure, thoroughly cleansing the cylinder. The vacuum, however, depends upon the strength of the explosion, the length of pipe, the proper time of opening the air inlet valves and a number of other variable features, so that it seems only applicable to stationary engines where the conditions are reasonably fixed. If the exhaust pipe is too long or too short, or the inlet valve does not open at the proper time as compared with the pressure of the exhaust gases, the action does not take place. The principle of operation is quite simple. If a steel spring be compressed and released at one end, it will jump several times its length, and gases in the engine act likewise if released under proper conditions.

CHAS. E. DURYEA.

"The Item of Cost."

Editor HORSELESS AGE:

Kindly allow me a word in rebuttal of your criticism of two items in my recent article.

The cost of barns.—You will notice no separate item for storage, only a reference to a charge of $10 for a month's storage while one of my carriages was undergoing the double and extensive overhauling referred to.

As this is about the minimum price for which one can secure storage in our large cities, the total cost for twenty-six months would have exceeded the cost of my barn ($250) by $10. Hence, whatever else may be said against the propriety of including the cost of barn in the cost of operating, in this instance it has not increased but actually lowered the cost.

In future accounts, of course, only the interest on the investment and painting of barn can be included. This will make, in itself, a much better showing.

Repairs to second carriage.—In order to depend on automobiles exclusively a second one was required before two years had passed; either a second one or a horse and carriage. This machine, too, required repairs, and these are included.

The total net amount represents the cost of twenty-six months' driving, one carriage being driven about 12,000 miles and the other less than 2,000.

A more legitimate criticism of my paper would be the omission of the cost of my second carriage. In subsequent estimates I shall start out with this cost, but it will only be after the carriage is worn out or sold that I shall be able to get at the net cost of operating per mile. That this will be less is reasonably certain. Did I not feel so I should give up automobiling forever, and I should try to be reasonably satisfied with horse driving, bicycling or walking as a means of progression. In the meantime I shall try to be fair to the automobile, which, divested of some of its shortcomings, is the ideal carriage for the doctor and his like. Even with the present ones it is "tolerable," although likely to be a little costly in the hands of many of us. My own experience is not unique. An extensive correspondence has afforded ample proof. Frequent verbal and personal admissions likewise.

DANIEL LONGAKER.

Why Two-Cycle Engines Sometimes Run Faster with Muffler.

Editor HORSELESS AGE:

Referring to the "Explosive Engine Queries" in your issue of September 10, I have observed the same phenomenon in a two-cycle motor—an increase of speed when the muffler was put on.

In my case it was due to a portion of the good mixture being forced out of the exhaust, with the muffler off, while the exhaust charge was being driven out, before the piston closed the port, this cutting down the amount of charge and giving a weaker explosion. On the other hand when I put the muffler on it held back a portion of the charge, so only the exhaust passed out of the cylinder. And all of the new charge was retained and compressed, therefore giving a more powerful explosion and an increased speed. But there should not be any appreciable back pressure caused by the muffler in a two-cycle engine.

F. L. L.

A Peculiar Fire Accident.

YOKOHAMA, September 1.

Editor HORSELESS AGE:

I think the following accident would be of interest to show in how many unexpected ways things can go wrong and how one should take every care in handling gasoline. A Japanese to whom we had sold a quad runabout was fond of putting in new cylinder oil every day, no doubt to make sure that he got sufficient lubrication; but he got a lot of other things with it when the crank case began to fill up, and after very indignant complaints that it would no longer run he was convinced that he had been making a mistake. He was bent then on cleaning out the motor to get rid of all bad oil, and his eagerness to do this well nearly cost him an eye.

This particular machine has both handle and plug switch, and the owner was carefully instructed to turn off the one and remove the other when he was through with the machine; also when he filled gasoline to be sure his electricity was dead. This seemed O. K. until the time above mentioned, when he removed the spark plug only, thinking that with this removed it would be the same as closing off the switch. He then proceeded to squirt gasoline in at the plug hole to clean the cylinder. It would not go down, and so he began turning the rear wheels. Well, it happened that the wire was about half an inch from a cooling flange and the vibration was enough to make it touch, and then there were some fine sparks not on the menu. One of these set off the gasoline and it shot out like a fire stream from the plug hole into the man's face and nearly burned the office boy's hand to a crisp. It was all over in a minute, and although the tank was full of gasoline and the flames leaped all around it, nothing further happened. The man thought he was dead, and that gasoline was the most dangerous stuff in the world. After he was able to get about we convinced him that an accident like this did not happen once in 10,000 times, and that such carelessness deserved a good object lesson. Can you tell me if an accident like this is at all frequent? I should think that the circumstances, all in all, are such that it would hardly happen often, and if any of your many readers has any knowledge of similar cases I should like to hear of them.

It may interest you to know that I have built a small boat and fitted it with a Thomas 3 indicated horse power air cooled motor, and I get good use out of it.

N. BAHENHEIM.

[We have never heard of an accident of this kind before. Most people here are, of course, perfectly aware of the great inflammability of gasoline vapors, and take due precautions.—Ed.]

Believes in Air Cooling.

Editor HORSELESS AGE:

I was glad to see Mr. Fairchild's good word for air cooled automobiles in your last issue. I believe in air cooling. I do not own an automobile yet, but I want to, and I want it to be air cooled. Why carry along 100 pounds or more of hot water and pipes and pumps when fresh air can be used for the same purpose and left behind when heated? Moreover, water in most parts of the country leaves more or less mineral deposit when evaporated. In many parts of my State the little pipes and cast water jackets would fill up with grit in a few months and how would they ever be cleaned out? There is a great future for the automobile, too, in this plains country (Texas). The distances are long and the roads ideal—hard, smooth and level. People often drive 30 or 40 miles to town, do their shopping and drive back again the same day. It would be a great place for automobile stage lines, but they must not use water.

I think the motors should be fan cooled.

the fans being connected directly to the motor shaft. The motion of the vehicle cannot be depended on for cooling, because the motor works hardest on bad roads where the vehicle must go slow.

F. REAUGH.

Wants to See a Federal Law.

Editor HORSELESS AGE:

I would like to see Federal laws to govern the speed and licensing of automobiles, which would do away with the local laws, so that it might be possible for a person to take a tour through several States without being liable to be arrested for breaking some law which is entirely unreasonable and void of any kind of good sense.

Such a law, in the writer's opinion, would be a great advantage to the automobiling public, and would be thoroughly practical.

Such laws apply to navigation and marine work; why not to land navigation? Automobiling is not something of local interest only, but something of national interest—a means of travel and transportation, and should be governed by a general or Federal law.

I am pleased to note the stand THE HORSELESS AGE has taken in this matter, and hope its influence will be a factor in obtaining the proper laws for automobiling

A. F. LAW.

Short Trip in the Far West.

Editor HORSELESS AGE:

A little automobile trip in the State of Washington might interest others of your readers, so will give an account of same. A friend had made a trip out in the country, about 30 miles from Spokane, and in coming back had blown up a tire, so telephoned me to go after it. Leaving Spokane on the morning train I rode 26 miles East up the Spokane Valley to the little town of Post Falls, and there found the machine, a regular four wheeled gasoline phaeton. I soon repaired the tire, and after looking the machine over I oiled up and proceeded to twist the crank a couple of turns, when the little motor started with a hum. I climbed in and started, and had run about a mile when I noticed a continuous missing of explosions. I pressed the battery button and the misfires ceased, so concluded that my magneto was not doing the work. I looked it over to see that it was properly oiled and ran free, and found everything all right. So I set the governor a trifle tighter and examined the flywheel to see that no grease interfered with the proper driving of the magneto. Then I started again and the motor ran smoothly, so I started away.

The first few miles was through little ravines, down hill and up again, little pitches, short but steep, 12 to 15 per cent. The machine handled like a light locomotive—a twist of the wrist and the wagon sailed up the grades as smoothly as a boat over the water. Soon I was out of the timber and the Spokane Valley lay before me, a beautiful str miles and running due west. It was one of the beautiful September mornings that make a man feel glad that he has lived another day. The roads were trifle rough to me and would have appeared very rough to an Eastern man, but a twist of the wrist and I would drop down to a 5 mile gait, pass a team or dodge a rough spot; then a gradual opening of the throttle and the machine would plunge ahead again. In about twenty minutes I had reached Spokane Bridge, 8 miles away. I passed an old three wheeler ahead at the side of the road that has been doing service for four years and still has the hardest service of any machine in the country. I stopped here at the store for about five minutes to talk automobile news; then gave the crank another twist, set the clutch and moved ahead.

From here to Spokane, 18 miles, the road is beautiful, the valley picturesque with mountains on either side, timber in the distance and the winding river at my left. I increased the opening of the throttle and those engines responded as quick as thought. Away I flew, a cloud of dust behind and all clear ahead. The wagon ran as steady as an ocean greyhound. The motor had now settled down to steady business, and it seemed that it scarcely varied a revolution per minute. I soon came to the line of the Northern Pacific Railroad, where a big double header, with one simplex and one compound locomotive hove in sight. I ran alongside for about a mile, but they were too slow for me with all their crowding. I never handled anything in my life that felt so sensitive, unless it was a light locomotive. The engines were hot and working like a charm—the slightest twist of the throttle handle and I would rush up a 5 per cent. grade at a 20 mile gait, and on the descent a little twist back and I would hum along at the same steady pace, only the puff of the exhaust weakening. At Trent I crossed the bridge and had to climb a 5 per cent. grade for about half a mile; then I struck the homestretch, opened her up and for 9 miles flew along at a speed that it seemed the defective tire would come off or fly to pieces—but it didn't. In just seventeen minutes I was in Spokane, and running down to my store I ended the trip, short but delightful. It was not a record run, or a race, but taking a delightful ride on a beautiful morning. I was one hour and twenty-five minutes making the 26 miles, 6 of which had to be run slow on account of rough roads or being within the city limits. About five minutes after my arrival the owner of the wagon came, took the machine and started off, and I haven't seen it since. GEO. E. BARTOO.

Circulation in Water Tube Boilers.

Editor HORSELESS AGE:

The writer notes that in your description of the Salamandrine boiler you speak of the circulation of water in the outside coil as though it traveled entirely through the coil and discharged its steam and water into the centre standpipe at the top. The writer has not been able to acc this and must admit it doesn't lo as the coil is connected to the st at the top and bottom, which wo urally cause the water to find its o with the water in the stand pipe, a steam generated in the coil shoulc water therein, would there not be pressure on the water below it to into the stand pipe at the bottom?

Then the steam generated in small coils and the stand pipe is up by the end of the outside coi centre and would have a tendency or force back any flow in the opp rection coming from the end of the coil.

The writer doubts very much i pump with ⅛ inch discharge woul enough current to cause the water its level in the outside coil, while th has a free passage from the bottor coil to the stand pipe.

Would there be any advantage ir all the water pass through the out first and be discharged into the the stand pipe, and if so, would n necessary to plug the bottom con to the stand pipe and pump direct bottom end of the coil?

A SUBSC

[We are unable to say whether water fed to the boiler passes thro outside coil or not. There are tw which tend to make the water ris outside coil—first, the flow or im the water from the feed pipe, whic discharges directly into the coil right angles to the connection to th pipe at the bottom; second, the c able amount of heat absorbed by side coil. Both of these factors a able, and as the question would upon still other variable quantities, the height of the water in the b cannot be answered directly. The tion in the outer coil may evide either less, equal to or greater than t depending upon design and mo conditions. The main consideratio doubtedly that the large external filled with water at all times.

The heat, of course, tends to fo water upward in the outer coil the in the regular generating coils. Th coil presents a very large heating and steam is being generated in i coil may, then, be considered to c mixture of steam and water, the gravity of which is considerably le that of water, and the "mixture" will rise to a height such that the pressur this height (or head) and specific is equal to the pressure due to the water in the central stand pipe.—E

WANTED.

Subscribers of the HORSELESS AGE willing to solicit subscriptions fro friends on a commission basis.

Address EDITOR HORSELESS

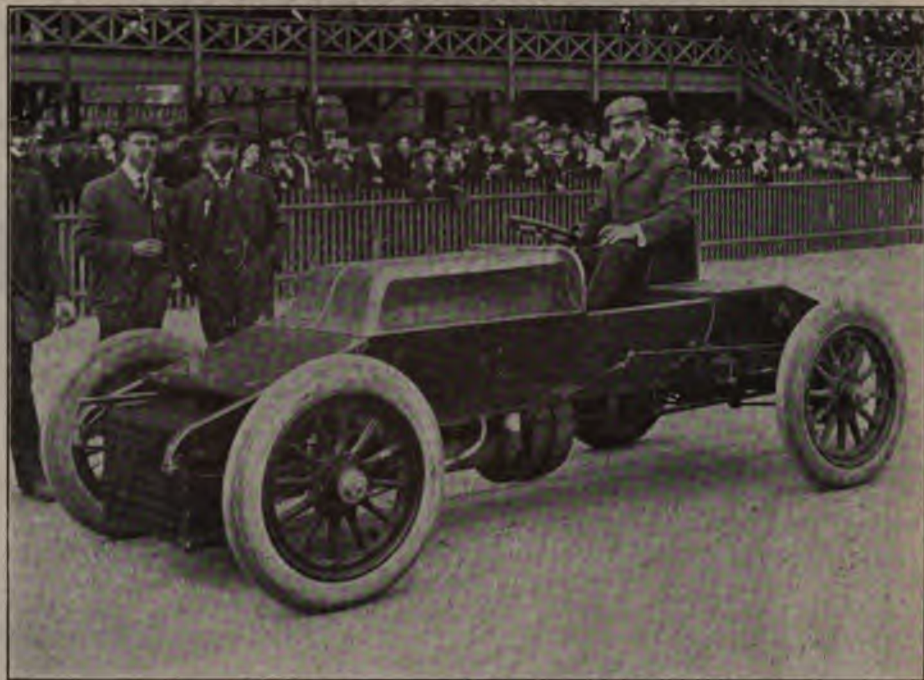
The Cleveland Automobile Races.

The Cleveland Automobile Club's races at the Glenville Track, Cleveland, on September 16, the results of which were briefly reported in our last issue, were quite successful. The immense grand stand was filled completely and crowds lined the fences on either side of the track. It is estimated that 10,000 people witnessed the events.

Promptly according to schedule the gong sounded for the opening event. Owing to the late arrival of certain steam machines race No. 2 was called first. The little red machine No. 1, driven by J. D. Dickson, got away first, but No. 31, H. S. Moore in an Elmore, soon caught the pace and gradually increased his lead, winning first place. There were only three contestants, and all of the machines were of regular model and not built especially for racing.

Event No. 1 was then called. Six contestants appeared on the track. One White machine was disabled at the start, and had to be pushed off the track to avoid the starters on their first turn down the stretch. No. 3, L. E. Hoffman driving a machine of his own make, took the lead for the first mile; but when the big White machine let out a link or two it was readily seen that all others were outclassed, the White, No. 23, winning by half a mile. This machine was a special, with very large boiler capacity and two large flues sticking above the body to carry away the burned gases. The Geneva and Hoffman, finishing in the order named, were machines of regular make.

Race No. 3 was one of great interest. No. 13, C. B. Shanks, got away first, with No. 18, a Mercedes, driven by H. S. Harkness, a close second. These two left the bunch pretty well behind, and the fight for third place was between No. 2, a Peerless, driven by L. P. Mooers, and No. 10, a Winton touring car, driven by Percy Owen. The big Mercedes passed the Winton "Pup" at the third mile, and from then on had everything its own way, winning first place easily, with the Winton "Pup" second, Winton touring car, No. 10, third, and Peerless, No. 2, fourth. The big Mercedes had not been weighed before the race, but it was afterward ascertained that it exceeded the weight limit by over 200 pounds; it was therefore disqualified, and the race went to the Winton "Pup."

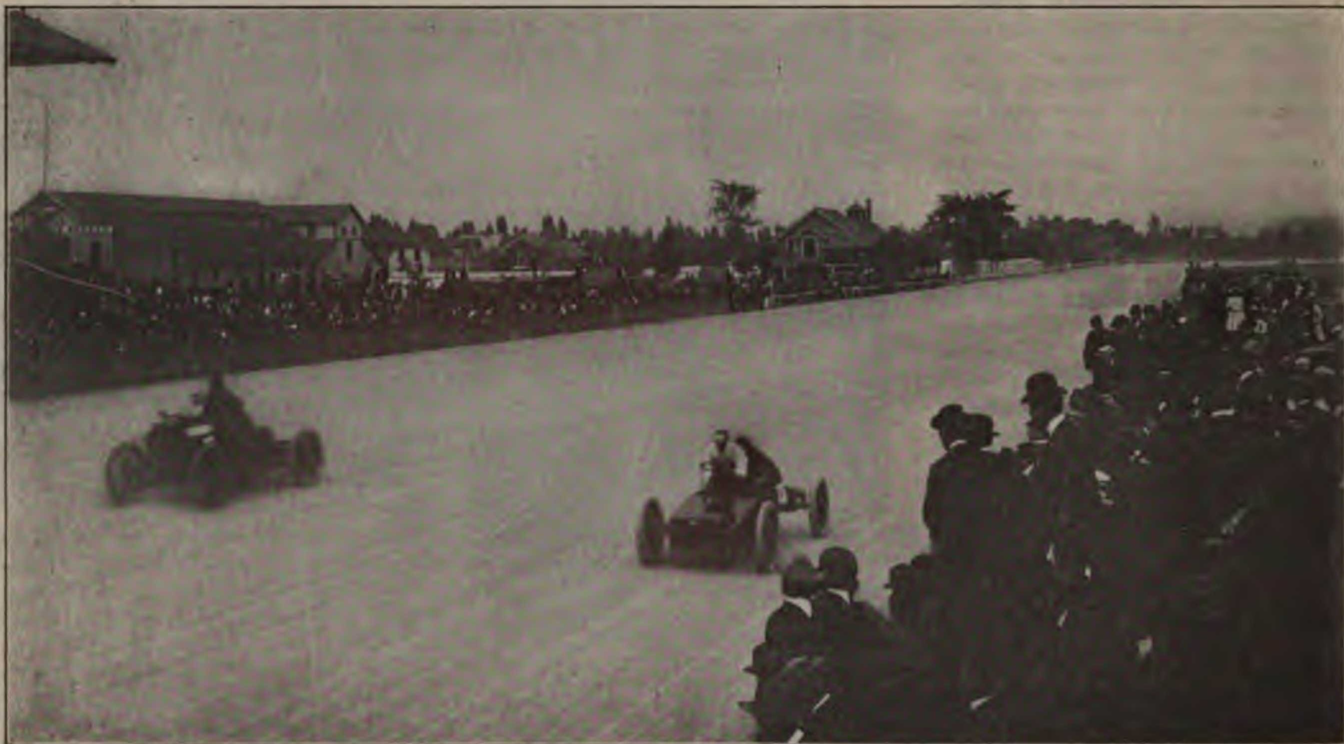


The Winton "Bullet."

The next race was a special 5 mile against time by Rollin White on a White special steamer, No. 23. The time for the 5 miles was 6:43, smashing all previous track records for steam machines.

Race No. 4 was soon called and four lined up for the start. No. 6, a Waverley, driven by W. M. Wright, took the lead for the first mile, with Walter Baker, No. 26, second. Baker, having jockeyed the bunch sufficiently, gave his machine the last notch on the controller and it sped away, winning easily by 100 yards, with Waverley, No. 6, second and Baker, No. 27, third. Time, 5:54¾. As far as could be ascertained the winners of second and

Start of the 10 Mile Handicap.



Finish of the 10 Mile Handicap. Shanks Passing the Mercedes.

third place used regular road machines, but the winner of first place used a special battery of light construction.

The starters in race No. 5 were the winners, seconds and thirds in the first four races. However, only six of the twelve eligible lined up for the start. This was another race that excited much applause from the grand stand. No. 1, a Cleveland, driven by Mr. Dickson, was first to start, with a six minutes' handicap, followed by No. 31, an Elmore, with five minutes handicap; then No. 6, a Waverley electric, with four minutes. Some of the starters had already circled the track on the 10 mile run before the big White steamer started with a two minutes' handicap and the Winton touring car, No. 10, driven by Percy Owen, with a minute and a half handicap. Lastly at scratch came C. B. Shanks on the Winton "Pup," No. 13. For 2 or 3 miles the big White steamer kept so close to the "Pup" that it was readily seen Shanks would not make up the lap gained by the White steamer with a two minutes' handicap. He was making a good fight for second or third place until in the fifth mile the right forward tire blew up on the "Pup" and put him out of the race. The White steamer, No. 23, finished first, in 14:59½, and Percy Owen, on Winton touring car, No. 10, finished second.

It was next announced that the Baker torpedo would appear on the track. After some delay a big white torpedolike monster glided silently down the track and retired after making two turns. No attempt was made at speed, as it is claimed the machine was built for straightaway speeding and could not negotiate the turns of the track.

Owing to the lateness of the hour race No. 6 was reduced from 25 miles to 10 miles. In this race the big Mercedes, No. 18, the champion of the Brighton Beach track, met its Waterloo, Alexander Winton, on the Winton Bullet, No. 11, winning. This race was full of interest and each contestant received his share of applause as he passed the grand stand. Winton's first mile was slow and Harkness stayed with him; but on the second mile the Bullet shot ahead and gradually increased its lead over the field. After passing the 5 mile mark it was announced that Winton had broken the 1 and 5 mile records. At the finish of 10 miles it was announced that a new world's record of 10:50 had been made, the best single mile being 1:02¾.

The White Record Breaker.

Race No. 7 was an Australian pursuit race. H. S. Harkness on the Mercedes at the half mile post and Alexander Winton on the Bullet at the wire were the only starters. The Bullet caught the Mercedes in 4⅜ miles, the time being 4:41. It was again announced that the world's record of a few moments before was reduced to 1:02¼.

In race No. 8, a 10 mile handicap, open, seven lined up for the start. Percy Owen on Winton touring car, No. 10, won first, with 3:30 handicap; Rollin White on White racer, No. 23, won second, with 2:30 handicap; Paul Rainey on a Panhard, with 4:30 handicap, took third place; the Peerless, with 3:30 handicap; the Winton "Pup," with 1:30 handicap, and the Mercedes at scratch, the finish in the order named.

The next race, No. 9, a 200 yard ob-

stacle race, was started with a number of entries, but abandoned owing to increasing darkness.

RACE NO. 1.

FIVE MILES—STEAM—ALL WEIGHTS.

No.	Name.	Make.	Time.
23..	Paul Deming.	White.	9:53½
5..	John McDonald.	Geneva.	....
3..	L. E. Hoffman.	Hoffman.	....

RACE NO. 2.

FIVE MILES—GASOLINE—1,000 POUNDS AND UNDER.

No.	Name.	Make.	Time.
31..	H. S. Moore.	Elmore.	11:19½
1..	J. D. Dickson.	Cleveland.	....
29..	Geo. W. Dunham.	American.	....

RACE NO. 3.

FIVE MILES—GASOLINE—2,000 POUNDS AND UNDER.

No.	Name.	Make.	Time.
18..	S. H. Harkness.	Mercedes.	6:32¾
13..	C. B. Shanks.	Winton Pup.	....
10..	Percy Owen.	Winton.	....
2..	L. P. Moores.	Peerless.	....

Mercedes disqualified, having exceeded weight limit by 220 pounds.

RACE NO. 4.

THREE-MILE ELECTRIC.

No.	Name.	Make.	Time.
26..	Walter Baker.	Baker.	5:54¾
6..	W. M. Wright.	Waverley.	....
27..	C. E. Denzer.	Baker.	....

RACE NO. 5.

TEN MILE HANDICAP, FOR WINNERS AND SECONDS IN RACES NOS. 1, 2, 3 AND 4.

(Handicapped by the judges and referee after above races have been run).

No.	Name.	Make.	Time.
23..	Rollin White.	White.	14:59½
10..	Percy Owen. 1½m.	Winton.	....

RACE NO. 6.

TWENTY-FIVE MILES, OPEN (REDUCED TO TEN MILES).

No.	Name.	Make.	Time.
11..	Alex. Winton.	Winton-Bullet.	10:50
18..	H. S. Harkness.	Mercedes.	....
2..	L. P. Moores.	Peerless.	....

SUMMARY OF TEN-MILE OPEN RACE NO. 6.

Make.	Ind. Miles.	Aggregate.
1..Winton.	1:20	1:20
2..Winton.	1:03	2:23
3..Winton.	1:02¼	3:25¼
4..Winton.	1:03¼	4:28½
5..Winton.	1:02¾	5:31¼
6..Winton.	1:03½	6:34¾
7..Winton.	1:03¼	7:38
8..Winton.	1:04	8:42
9..Winton.	1:03¼	9:45¼
10..Winton.	1:06½	10:50

RACE NO. 7.

AUSTRALIAN PURSUIT.

No.	Name.	Make.	Miles.
11..	Alex. Winton.	Winton-Bullet.	4⅝
18..	H. S. Harkness.	Mercedes.	4.41

RACE NO. 8.

TEN-MILE HANDICAP, OPEN.

No.	Name.	Make.	Time.
10..(Handicap 3:30)	Percy Owen.	Winton.	13:34
23..(Handicap 2:30)	Paul Deming.	White.	....

NEW VEHICLES AND PARTS.

The Paul White Steam Truck.

We have repeatedly referred to a number of very large motor trucks recently delivered by the White Steam Wagon Company, of Indianapolis, Ind., and herewith print a photo of one of these wagons as used by the Hoosier Flour Mills, of Indianapolis, in delivering flour to the retail trade. This wagon is one of the largest built by the White Company, having the usual dimensions of 25½ feet in length and 8 feet in width and a platform area of 19x8 feet. Its load capacity is 12,000 to 13,000 pounds.

With its trial load the vehicle is said to have run around the streets of the city and up and down the steepest grades with ease. A speed of 5 miles per hour was easily maintained.

The fuel is coke and the steam pressure is 225 pounds, carried in a water tube boiler. This wagon has a 35 horse power compound engine. The wheels are all steel and are 40 inches in diameter. The drivers have patent steel tires 12 inches wide and the front wheel tires are 8 inches wide. All are arranged to prevent skidding and secure adhesion without injuring the asphalt pavements in hot weather.

Although this wagon is of massive construction it is claimed not to be ungainly looking and does not attract extraordinary attention on the streets.

Besides the usual fittings this wagon has a two speed gear operated from the driver's seat; a shifting valve on the engine, changing the compound engine to a double single engine for heavy torques, with a foot lever. An emergency brake of very powerful construction acts upon a special flange inside of the drivers. The water tank is of sufficient capacity for 15 to 18 miles.

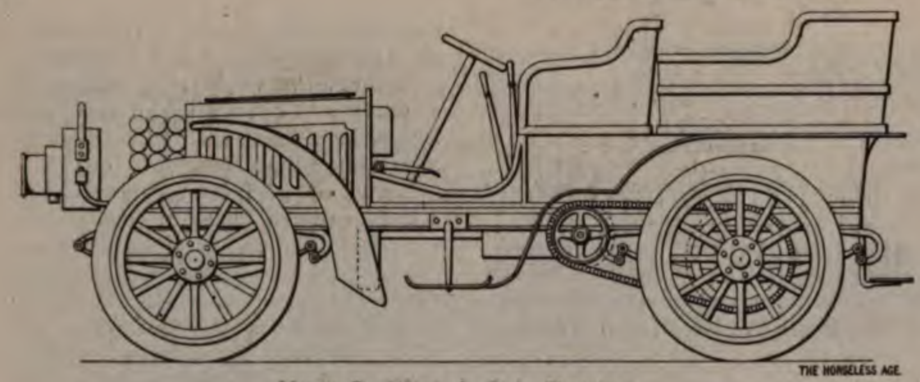
We are informed by the builders that they have under construction wagons to be used by engineering works about their premises and to depots, for breweries hauling coal and beer, and packing houses for loads less than car lots to the depots.

These wagons are for 5 and 6 ton loads, with platforms varying from 10x6 feet to 14x7 feet, fitted with bodies and platforms to suit the several conditions.

Hugh B. Wick & Co.'s Gasoline Tonneau.

Hugh B. Wick & Co., of Youngstown, Ohio, have under construction a gasoline tonneau designed by L. B. Smyser. The machine is equipped with a 30 horse power four cylinder vertical motor of 4¼x 6 inches cylinder dimensions and a shifting gear transmission, giving three forward speeds and one reverse. The body has seats for four and is of aluminum, it

6 Ton Steam Truck of the Paul H. White Steam Wagon Company, Indianapolis, Ind.



Hugh B. Wick & Co.'s Tonneau.

and the wooden wheels being by Quinby & Co., of Newark. The drawing herewith shows a side elevation.

The Berg Gasoline Automobiles.

H. O. Berg, of the Berg Automobile Company, 100 Broadway, reports that they are progressing rapidly at the works of the Cleveland Machine Screw Company in turning out their gasoline cars.

Mr. Berg says that they do not claim to have produced any new features, except in the way of assemblage, their method having been to employ and copy exactly the best construction found in the foremost foreign makes of cars; building and putting them together with the aid of the best skilled workmen. He says he believes it a surer plan to copy the most successful designs found in the very best European cars, thus producing a vehicle composed of known and tried elements, than to pursue a course of uncertain experimenting.

The German-American Gasoline Car.

The German-American Automobile Company, of 134 West 143d street, New York, have produced the first of their cars.

While the general lines of the Daimler engine have been followed, some novel features are included to render the car better adapted for use on American roads. The normal speed of the engine is 900 revolutions, at which rate it is said to develop 24 horse power, but we understand that in a test by gauges the engine was run from 137 to 1,485 revolutions, showing a wide range of variation. An atmospheric inlet is employed, with throttle control.

An expansion clutch of novel design is used, and is said to be positive and free from the danger of working loose.

The transmission is substantially the same as in the Mercedes, but includes a novel lever locking device, with the aid of which it is said to be impossible to strip gears.

Four speeds forward and one reverse are provided. The car weighs 2,600 pounds

The gasoline tank capacity is 35 gallons, and the water tank 10 gallons. An emergency expansion brake is applied to each rear wheel. A band brake on the countershaft lowers its speed, being operated by the pedal for throwing out the clutches, and similarly a band brake acts on the main shaft in connection with the pedal for shifting the gears.

Special attention has been paid to the general construction, the parts, such as the frame, axles, pivotal knuckles, spring hangers, springs, &c., being of high class material and of great strength.

The New German-[illegible]ican Gasoline Cars

The car starts easily, the engine run very smoothly, in a manner comparabl that of the Mercedes. With the en throttled down to the working limit speed can be reduced to about 5 or 6 r an hour, while at high speed it is sai be capable of 40 to 45 miles an hour.

A valuable feature resides in the al to turn short, a good leeway existing tween the steering wheels and the b which latter is of reduced width at its ward, engine supporting end.

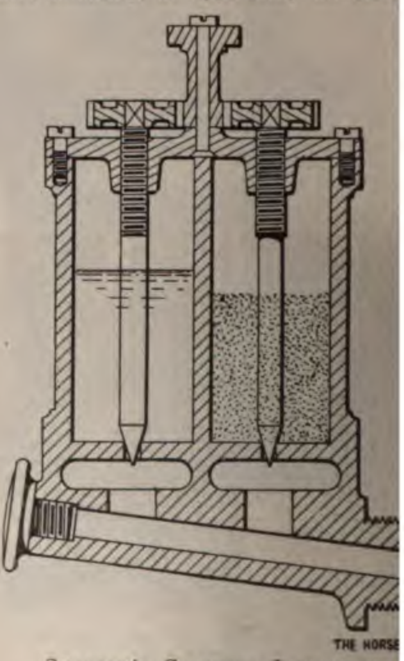
Dyke's New Ignition Contac Breaker.

A. L. Dyke, St. Louis, has brought o new contact breaker for high tension tric ignition outfits. The device consists disk of insulation material carrying a n segment embedded in its periphery. U the periphery of this disk bear two r brushes, one of carbon and one of n gauze, pressed against the disk by c springs. The holder for the brushes i insulating material, and the current is ducted to and from the brushes through adjacently located binding posts, which clamped in the brush holder and are in tallic connection with the springs brushes. With this circuit breaker or i rupter the primary circuit is not groun

For a vertical engine located in front interrupter can be placed on the dashb and be driven from the crank shaft l chain. The device is made for both s and multiple cylinder engines.

Simpson's Graphite Cylinder bricator.

The application of graphite to cyli lubrication is still attended with consi able difficulty, as apparently no mea



Simpson's Graphite Lubricator.

known for feeding the graphite with a lute regularity. We show herewith a bricator invented by W. Simpson, desi to feed to a cylinder at the same

powdered graphite and cylinder oil. The body of the device comprises two compartments, one containing the graphite and one the oil. Each of these compartments is provided with a needle valve controlled opening at the bottom. The two needle valves are provided at their upper end with a small spur pinion each, keyed to them and in mesh with a central pinion on the stem of a thumb screw. By turning this thumb screw, which has a milled head, the two needle valves are opened and closed simultaneously. The feed of graphite and oil is always in the same proportion. The oil and graphite drop separately into the passage at the bottom of the device and the oil carries the graphite along.

Experiments are said to have shown that with 10 per cent. of graphite an excellent lubrication of the cylinder is secured and with this proportion there is no danger of clogging the passage.

Angell & Fairbanks' Motor Lawn Mower.

The photo herewith illustrates a motor lawn mower built by Angell & Fairbanks, of Ithaca, N. Y. It is a 36 inch mower and is driven by a 2 horse power gasoline engine. The speed and steering gears are controlled by means of the handles.

The Centaur "Live" Axle.

The "live" or driving axle herewith illustrated is manufactured by the Centaur Motor Vehicle Company, of Buffalo, N. Y. The axle is shown as provided with a truss rod, which is said to be necessary when the axle is used for vehicles over 1,200 pounds. Below this weight the truss rods are not required.

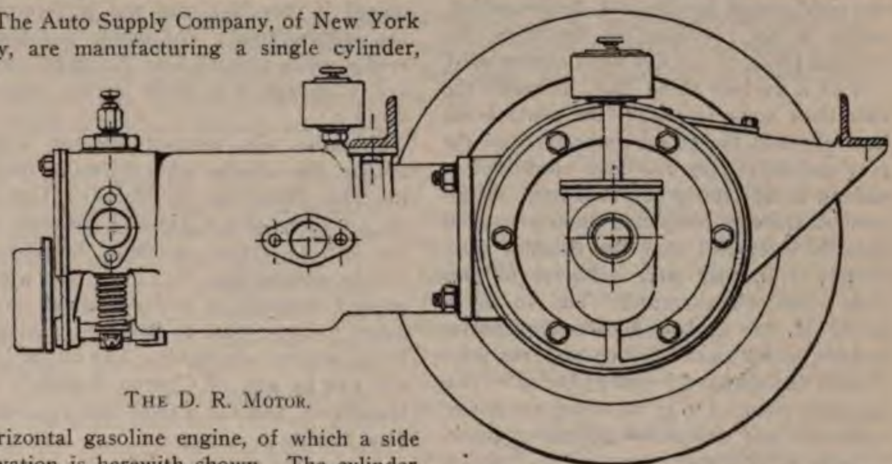
The axles are machined from 1 7-16 inch solid stock, key seated for 1¼ inch hubs. The sleeves are made from 2½ inch O. D. No. 8 gauge Shelby seamless tubing and the gear case and cup receptacles are brazed to the sleeve, machined and ground in position. The axle runs on ⅝ inch high duty steel balls in ground steel races provided with an effective adjusting device.

"CENTAUR" LIVE AXLE.

The gear case is divided in halves with an interlocking fit held in position by finished cap bolts. The spring seats, with which studs are cast integral to receive distance rods or struts, can be located to correspond with any distance of spring centres desired. In the standard axle the sprocket is located in the centre. The differential gear is a Brown-Lipe spur pattern and the axles are furnished either with or without differential gears, with or without brakes and with or without truss rods.

The D. R. Gasoline Motor.

The Auto Supply Company, of New York city, are manufacturing a single cylinder, horizontal gasoline engine, of which a side elevation is herewith shown. The cylinder has a bore of 5 inches and the piston stroke is 6 inches. The cylinder is water jacketed over its whole length, as well as the head and valve chamber, and the latter are cast integral with the cylinder, thus avoiding packed joints. Both valves are arranged vertically and are mechanically operated. The circuit breaker for the ignition is placed at the end of the cam shaft at the back of the motor, where it is convenient for inspection. The piston is said to be of unusual length and to be provided with four packing rings. The crank chamber is of aluminum and has an extension which permits of its being bolted to a cross bar of the frame. Another bearing for supporting the motor is provided on the cylinder casting. The main bearings of the engine are of phosphor bronze, 5 inches long, and provided with a chain oiling device. The cam shaft gears are inclosed in a dustproof aluminum casing. The flywheel is 20 inches in diameter and coned out to serve as a clutch member if desired.



THE D. R. MOTOR.

MOTOR LAWN MOWER OF ANGELL & FAIRBANKS.

Additional Entries for A. C. A. Reliability Run.

The following additional entries had been received by the A. C. A. up to Tuesday afternoon:

Class. Power.	Make.	
C..Gasoline.	Apperson Bros.	H. K. Browning
B..Gasoline.	A. Darracq et Cie.	F. A. La Roche.
B..Gasoline.	H. H. Franklin Co.	S. G. Averill
B..Gasoline.	Knox Auto. Co.	Knox Auto. Co.
B..Gasoline.	Knox Auto. Co.	Knox Auto. Co.
B..Gasoline.	Knox Auto. Co.	Knox Auto. Co.
B..Gasoline.	Fiat, Torino, Italy.	C. H. Tangeman
C..Electric.	Neftel Auto Co.	Knight Neftel

The four vehicles entered by H. B. Shattuck & Son, which at going to press last week were unclassed, are an Oldsmobile, an Autocar, a Packard and a Fournier-Searchmont, the first in Class A, the second in Class B and the third and fourth in Class C.

Smith & Mabley are extending their station on Seventh avenue, New York city. They have rented the adjoining building, a corner house, and are making various alterations.

...OUR... FOREIGN EXCHANGES

The Reliability Trials of the A. C. G. B. and I.

WEDNESDAY—TO WORTHING AND BACK.

In our last issue we gave a very brief account of Wednesday's run. The journey was to Worthing and back, 120 miles, and heavy showers half an hour before the start provided muddy and greasy roads for the first half of the outward journey. Sixty-two cars left the Crystal Palace, Mr. Arnott's Werner bicycle being an absentee in consequence of the severe fall which he sustained on the previous day through being assailed by a dog. Once well on the Worthing road the surface was found to be in grand condition, yet giving no dust, so that driving in the wake of so many cars was not unpleasant. Leatherhead was all abroad to see the automobiles swing the awkward corner for Dorking, before which, owing to the overhang of the trees, the heaviest roads of the day were encountered.

It is a curious thing that, although the conditions were favorable, the route being less hilly and the going better than on the previous days, very few cars succeeded in making an absolutely non-stop run. As almost all the cars completed the trip in good time, it is evident that the troubles were trivial; still, they were sufficient to prevent a blameless record. The 10 horse power M. M. C. had a defective contact breaker, which caused a stop of seven minutes on the outward journey; but after this had been attended to at Worthing the homeward run was completed without a check, in spite of the fact that the car carried five passengers instead of four. Mr. Jarrott's 15 horse power Panhard, a new type, had to stop to change an accumulator; the James & Browne car had to fit a fresh sparking plug, and similar minor happenings spoiled the symmetry of the day's record. By 7 o'clock all the vehicles were back in the garage, washed and on show.

THURSDAY—TO BRIGHTON AND BACK.

For the fourth day's trial the destination was Brighton, the run there and back of 87½ miles making a total of 467 miles of the 650. A start was made from the Crystal Palace at ten minutes past 7 in fine weather, and a capital run was made over roads in prime condition. The number of starters was sixty-one.

All the way to Brighton the police were on the alert. They lay in ambush at various points, and in some instances were apparently massed with the object of impressing the motorists with the majesty of the law. The motorists know the legal limit perfectly well, and complied rigorously.

There had been talk for some time of disqualifying one of the Pascals, trouble having arisen on various occasions between the driver and the observer, owing to the former taking advantage of stops for refreshments to make repairs and persisting in sitting on the footboard from where he could make adjustments without stopping. On Wednesday one of the strictest and keenest of the observers was assigned to this car, and rumors of a possible disqualification were again rife.

Crawley was reached at about 9 o'clock, the Panhard shod with Dunlop's tires being the first to arrive, Mr. Jarrott's Panhard second, and then followed a 22 horse power Daimler, the 12 horse power Century, one of the White steamers, the 20 horse power Maudslay, and the 12 horse power Belsize.

Between Redhill and Gatwick and between Handcross and Hurstpierpoint police lined the hedges and ditches and hid themselves behind corners. Their efforts resulted, it is believed, in about three cars being stopped. The motorists could see the plain clothes officers as soon as the officers saw the cars, and slowing down to 3 or 4 miles an hour in passing them, politely inquired if they had seen any policemen in the neighborhood. The scouts had discovered a police ambush near Piccombe corner, and a change was made in the route to avoid it.

Brighton was reached without serious mishap, the vehicles being drawn up outside the Ship Hotel on the Parade. Car No. 32, a 9 horse power James & Browne, was the first to arrive, reaching Brighton at twenty minutes past 10. There was a compulsory stoppage of fifteen minutes on the down journey, and at Brighton a stay of fifteen minutes was made. The return journey was by way of Clayton, Cuckfield and Handcross, and the Palace was reached in good time.

Among the troubles of the day were that a 12 horse power Brush suffered from a defective coil and a Clement from a sulky engine.

FRIDAY—TO TUNBRIDGE AND BACK.

Friday was, perhaps, the most important day of the trial, for the program of this day included a fuel consumption test and hill climbing trials. Sixty-one cars started from the Crystal Palace at 9 o'clock. In the morning the cars were weighed and this and the careful filling of the gasoline supply tank of each car made up the two hours' delay in the starting of the cars as compared with the other days. The weather was fine all day long.

The run out to Sevenoaks and on to River Hill, down which a second series of brake tests were held, and the first hill climb undertaken, was performed by the various officials aboard Mr. Edge's 16 horse power Napier, Mr. Owens' 16 horse power Napier, and a 12 horse power New Orleans, to which the Automobile Club's secretary had taken since the differential of his 14 horse power gave out on the return from Eastbourne. The idea in connection with this particular set of brake trials was to cause the cars to run slowly down the steep descent to River Hill and to come to rest at four points selec the steepest pitches, until signalled t tinue. It was thought that this prove a severer test than that ir upon the vehicles in the Palace gr on the previous Saturday. The fou tions were established by Professor Messrs. Lyons, Sampson, Bidlake, son, and Swindley, holding up th on their downward run by raising re at the allotted spots.

The steepest part of River Hill i or not quite 11 per cent. This gra cated at a sharp bend in the road. vehicles failed in the first attempts the hill owing to slipping clutche 7½ horse power Wolseley and the power M. M. C. with Martin tire found the bend too much for them former of these jumped its spra was placed too far forward and too at the side. The 16 horse power with Midgley tires did not equal i vious performance, sticking before re the bend. With the driver only on the 10 horse power Ariel got up. was made by the 12 horse power everybody except Mr. Critchley foot Long delay overtook the 22 horse Daimler driven by Mr. Instone, the coming off the commutator just wh car was ready to begin the climb.

Near the summit, just before th shades off into a less exacting gradi an outstanding hump, in length a ma a few feet only, which proved to cars the little extra strain that trans what looked like certain success int appointing failure. Some cars that tiated the bend found their Sedan No. 31, 10 horse power Georges Ri spilled all its passengers at the "hi they got out and pushed, and many cars either shed passengers or pushed.

As already mentioned, the cars River Hill at a selected point from a ing start, and made the best of thei to the summit against time. The ve were dispatched at regular interval timed on passing the summit lin watches of the officials at top and b being synchronized for the purpose. a number of spectators gathered on t to watch the scaling, many driving ou points around on their vehicles. C return journey from Tunbridge oc the only serious accident of the entire Five miles or so north of Tunbridg 40, the only 7½ horse power Wols the trials, in passing another car, ran ridden horse, which pranced direc front of it as it cleared the overtak The horse and its rider were prac scooped up on to the motor bonn horseman coming inboard on to the and observer, and the horse having broken so badly that it had to be sho rider was only slightly bruised, as w driver of the car by the unfortunat mal's head.

Many mishaps occurred near Ton

Ascending the Hill Outside Horsham (from "The Car").

r the Old Cock Tavern a 22 horse er Daimler, driven by Mr. Bush, was led with a tire puncture, and a 10 horse er Mors nearby had trouble with the rs. A New Orleans broke an axle in- e the hub, owing to a flaw in the metal, was claimed. The 12 horse power Daim- r driven by Mr. Lewis broke the bevel heel on the second motion shaft driving he differential gear. By 9 p. m. a new inion had been received from Coventry, nd by 2 a. m. on Saturday the damage had been fully repaired, the car arriving at the Palace at 4 a. m. The maximum time for the day was exceeded, however, and the car disqualified.

The task of apportioning the marks for the hill climbing and fuel consumption trials proved a heavy one, owing to the elaborate formula on which the calcula- tions were based, which took cognizance of horse power as shown by actual perform- ance, price of car and value of fuel con- sumed. Curiously enough, despite the searching nature of the trials, more "high- est possibles" were awarded for Friday's work than for that of any of the preceding days, no fewer than thirty-one cars receiv- ing the maximum of 300 marks. The previous performances of some of these cars had not been particularly brilliant, and in quarters where trade jealousy is keenest some surprise was expressed that the results should have placed them in so good a position.

The fastest time on River Hill and Westerham Hill was made by a 3 horse power chain driven Humber bicycle; but as regards the cars proper the results were somewhat uneven, due principally to difference of load. Of the twelve cars making best times up Westerham Hill, seven were gasoline and five steam. A 6 horse power Gardner Serpollet, carrying four passengers, made the next best time on River Hill, but only managed to secure the eighth place in the Westerham Hill ascent, with its steeper gradients, and a 20 horse power Wolseley, which was placed second in the Westerham climb, was eighth on River Hill. A 5½ horse power locomobile, with two passengers, made the third best time up Westerham Hill, and was sixth on the other ascent. A 15 horse power Panhard, one of the highest priced cars in the trials, which secured only one mark short of the highest possible for the five days, was beaten on Westerham Hill, by one-fifth of a second, by a 16 horse power Clement, which in the River Hill ascent made worse time than the Panhard by forty-nine seconds.

Dorking Control (from "The Automotor Journal").

SATURDAY—TO BEXHILL AND BACK.

Saturday's run was again a long one—121½ miles—and the first vehicles were started shortly after 7 o'clock. Fifty-eight vehicles were dispatched, in bright weather. It proved a dusty journey, but the cars behaved admirably, and except for one or two minor mishaps the trip was one of the most successful of the week.

On the way to Tonbridge a 10 horse Mors, a 9 horse power James & Browne and an 8 horse power Clement met with trouble of one kind or another and a Serpollet near Hayes Common had to shed two passengers, who pushed while the vehicle was proceeding up a rather steep incline.

At Bexhill the vehicles were lined up by the race track, a White steamer being at the head, having arrived first. Following it were the 20 horse power Wolseley, a 10 horse power Peugeot, a 10 horse power Wolseley, one of Baron Rothschild's Pascals, and the Baby Peugeot.

Past Blindley Heath, the honorary marshal had early discovered the police in ambush, and was, indeed, invited to a halt, but in lieu thereof he reversed for about ½ mile, and, turning off through a side road, regained the main road in time to notify the trap to the oncoming cars. The constabulary were, however, not to be deprived of their prey, for they held up Stocks on the 8 horse power De Dion, Maudslay on the 20 horse power Maudslay, and one or two others.

An untoward incident occurred on the homeward journey, about 15 miles from Bexhill-on-Sea, when a 5 horse power De Dion voiturette, which was not taking part in the trials, collided with a 16 horse

Tabulated Results of the A. C. G. B. and I. Reliability Trials.

Official No.	Name of Vehicle.	B. H. P.	No. Cylinders.	Bore (In.)	Stroke (In.)	No. of Passengers, Includ. Driver.	Weight Unladen, Lbs.	Marks for Each Day. 1	2	3	4	5
	CLASS A.—VEHICLES DECLARED AT A SELLING PRICE OF £150 OR LESS.											
1	Humber bicycle	3	1	3	3	1	135	....	....	....	....	....
2	Humber bicycle	2	1	2⅝	3	1	120	....	....	....	....	....
4	Century tandem	4½	1	3.36	3.6	2	448	294	300	296	300	300
5	Baby Peugeot	6½	1	4	4	2	728	299	*300	300	300	300
6	Werner motocyclette	1¾	1	2.56	2.88	1	75	....	....	....	....	....
7	Ormonde bicycle	1¾	1	2.62	2.96	1	100	....	....	....	....	....
	CLASS B.—CARS DECLARED AT A SELLING PRICE OF MORE THAN £150, BUT NOT MORE THAN £200.											
8	Oldsmobile	4	1	4½	6	2	784	Broke down.				
9	Locomobile	5½	2	2½	3½	2	728	273	262	283	277	298
10	Locomobile	5½	2	2½	3½	2	728	289	293	284	291	300
11	Swift	4½	1	3.36	3.6	2	952	299	282	295	295	held br over. do
	CLASS C.—CARS DECLARED AT A SELLING PRICE OF MORE THAN £200, AND NOT MORE THAN £300.											
12	Parr light car	8	1	4½	4½	4	1,344	282	Broke down.			
19	Star	7	2	3½	4½	4	1,624	279	297	291	294	300
20	Locomobile	5½	2	2½	3½	2	840	292	270	295	296	294
21	Locomobile	5½	2	2½	3½	2	840	296	295	296	300	298
22	Renault	6	1	3⅜	4	2	840	267	286	295	300	h. o.
23	M. M. C. voiturette	8	1	4	5.2	4	1,120	281	295	295	295	300
24	De Dion-Bouton	6	1	3.6	4.4	3	1,008	268	299	282	300	300
26	White steam car	6	2	3½	4	2	1,400	294	296	300	300	300
28	Georges Richard	10	2	4	4	2	1,232	Disqualified.				
29	White steam car	6	2	3½	4	2	1,400	300	300	300	300	300
	CLASS D.—CARS DECLARED AT A SELLING PRICE OF MORE THAN £300, AND NOT MORE THAN £400.											
30	Decauville	10	2	4.4	4.4	2	1,568	295	297	280	300	300
31	Georges Richard	10	2	4	4	4	1,232	297	293	300	300	291
32	James & Browne	9	2	4	6	4	1,792	300	296	295	300	295
33	Gladiator	12	2	3.6	4.4	4	1,512	300	300	300	300	289
35	Brooke	12	3	3⅝	4¾	4	2,016	289	300	286	299	300
36	Car fitted Simms 8 h. p. motor.	8	2	3.8	4.4	4	1,568	299	298	38	300	294
38	Star	11¼	2	4⅛	5½	4	2,016	292	Broke down.			
39	Wolseley	10	2	4½	5	4	2,016	300	300	295	300	166
40	Wolseley	8	2	4	4	4	1,680	300	299	300	300	289
41	Wolseley	10	2	4½	5	4	2,016	300	300	295	300	300
42	Belsize	12	2	4	4½	4	1,936	300	300	300	300	300
44	New Orleans	9	2	4	4.4	4	1,232	295	299	300	300	300
47	De Dion-Bouton	8	1	4	4.8	4	1,344	300	300	300	300	300
48	Clément	..	2	3 1-10	3 9-10	2	1,288	248	293	293	263	300
	CLASS E.—CARS DECLARED AT A SELLING PRICE OF MORE THAN £400, AND NOT MORE THAN £500.											
51	Gladiator	12	4	3	4.4	4	1,680	196	298	300	249	300
52	Ariel	10½	2	3 5-16	4	4	1,568	279	252	285	273	300
53	New Orleans	14	4	4	4.4	4	1,792	299	300	299	300	b'ke d
54	Century	11	2	3.52	4.4	4	1,680	273	298	6	300	298
56	New Orleans	14	4	4	4.4	4	1,792	299	Broke down.			
57	M. M. C.	10	2	4.4	5.2	4	1,792	292	281	290	300	284
59	Germain	..	2	3.8	5.2	4	....	297	300	300	300	300
60	Georges Richard	20	4	4	4	2	1,904	Broke down.				
	CLASS F.—CARS DECLARED AT A SELLING PRICE OF MORE THAN £500, AND NOT MORE THAN £600.											
62	Gardner-Serpollet	10	4	2.2	3.68	4	2,016	300	297	300	288	300
63	Gardner-Serpollet	10	4	2.2	3.68	4	2,016	291	280	300	300	300
64	Peugeot	16	4	3.76	3.76	4	2,128	299	299	300	295	300
65	Brush	14	4	3.40	4.72	4	2,016	300	222	289	292	....
	CLASS G.—CARS DECLARED AT A SELLING PRICE OF MORE THAN £600, AND NOT MORE THAN £700.											
66	Humber	12	4	3½	4	4	2,016	300	294	300	300	300
67	Humber	12	4	3½	4	4	2,016	....	....	....	....	....
69	Wolseley	21	4	4½	5	4	2,576	300	300	300	300	300
70	Mors	14	4	3 3-16	4¾	4	2,128	255	300	274	300	....
71	Wilson & Pilcher	12	4	3½	3¾	4	2,128	300	300	300	300	292
74	Germain	..	4	3.8	5.2	4	....	300	297	300	300	300
75	Clément	20	4	3 1-10	3 9-10	2	1,400	293	262	179	300	300
	CLASS H.—CARS DECLARED AT A SELLING PRICE OF MORE THAN £700, AND NOT MORE THAN £800.											
76	Daimler	14	4	3.44	4	5	1,792	297	300	296	300	300
77	Daimler	14	4	3.44	4	4	1,736	296	300	300	300	b'ke d
81	M. M. C.	24	4	4	5.2	4	....	300	300	25	300	280
	CLASS J.—CARS DECLARED AT A SELLING PRICE OF MORE THAN £800, AND NOT MORE THAN £1,000.											
82	Maudslay	25	3	4.8	5	4	2,632	300	298	300	300	299
83	Pascal	32	4	4.8	5.2	4	2,178	276	290	265	299	295
84	Pascal	32	4	4.8	5.2	4	2,178	294	286	300	300	300
	CLASS K.—CARS DECLARED AT A SELLING PRICE OF MORE THAN £1,000, AND NOT MORE THAN £1,200.											
86	Daimler	22	4	5	5.2	4	2,576	300	300	300	300	295
87	Daimler	22	4	4.2	5.2	5	2,576	300	300	300	300	163
88	Panhard	18	4	3.6	5.36	4	2,016	300	300	299	300	300

power Napier, on which the Midgley tires were being tried, and was overturned into a hedge. Nobody was hurt, but the smaller car was much damaged.

Mishaps were few on the day's run, and all the outgoing cars of the morning were early back to garage prepared for the examination of the judges, which commenced Sunday morning, and was continued throughout Monday.

THE TRIALS IN GENERAL.

Some statistics of the vehicles entered are given in the *Automobile Club Journal.*

The highest number of cars entered by one firm was five; three firms entered four cars each, six firms three cars each, six firms two each, and twenty-one each one car.

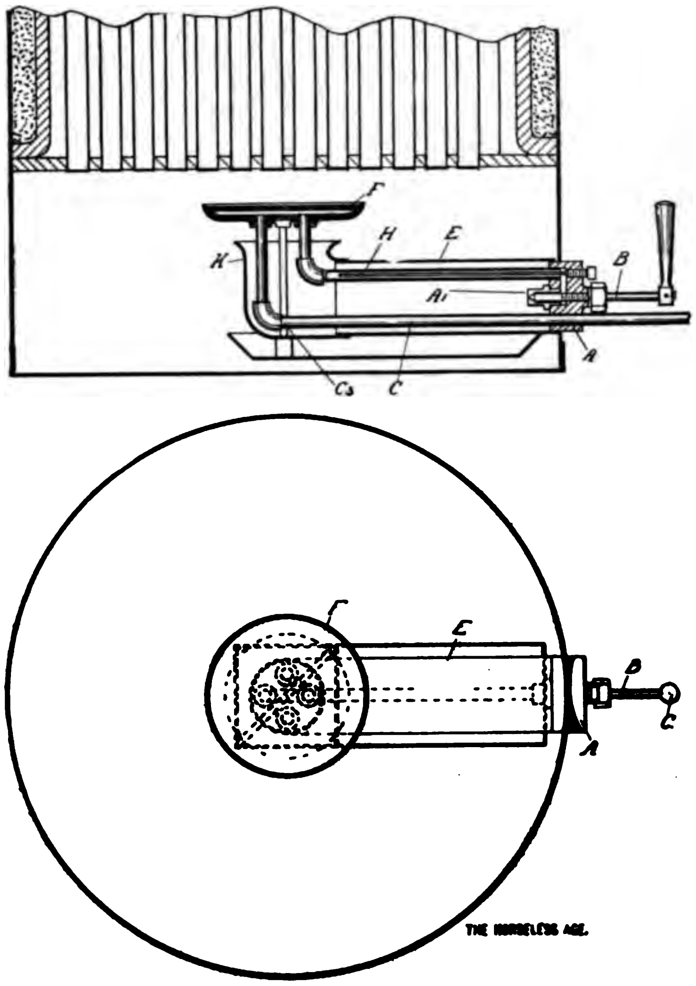
From the point of view of horse power there were fifteen cars of 10 horse power entered, thirteen cars of 8 horse power, twelve cars of 12 horse power, seven cars of 20 horse power, five cars of 6 horse power, four cars each of 5½ and 9 horse power, three cars each of 5, 7, 14 and 16 horse power, two vehicles each of 1¾, 4½, 7½, 15, 18 and 22 horse power, one vehicle each of 2, 3, 4 and 24 horse power.

Taking the seating accommodation, there were fifty-six cars for four persons each, twenty-two cars for two persons each, four vehicles for one person each, three cars for five persons each, six cars for two persons each, and three for one person each.

Taking the number of cylinders, there were thirty-seven with two, twenty-nine with four, nineteen with one, and three with three cylinders each.

Only two vehicles earned full marks every day, a White steamer and a 20 horse power Wolseley gasoline car. The marks earned each day by all the competing vehicles are given in the table herewith. These figures are still subject to revision and were given out by the club, so all competitors might have a chance of verifying the reports of their observers.

New Kerosene Burner.



ROOTS & VENABLES' KEROSENE BURNER.

The illustrations herewith show a kerosene burner for steam boilers recently patented in England by Messrs. Roots & Venables, the English manufacturers of kerosene explosive automobiles. A is a metal casting fitted with a screw needle adjuster. The needle adjuster B is so made that it is capable of reducing or closing the orifice in the nipple A_1. The nipple A_1 screws into the casting A and has a small orifice for the outlet of the vapor. The pipe C conveys the oil under pressure from the supply tank through the casting A and communicates with a chamber at the bottom of the dish shaped casting F. From this chamber leads another vaporizing tube H. Either vaporizing tube may be fitted with a wire or rod filed square in small burners, or having a screwed thread cut upon it in larger ones. This partly fills the vaporizing tube and causes a greater division of the oil or vapor, so subjecting it to passage over a larger amount of the heated surface. The tubular casing E encloses the vaporizing tubes H and C, and is fitted at one end on a turned seating provided for it in casting A.

The casing E fits into a right angled casing or thin casting K with an outlet at right angles with the casing E having a slightly coned mouth directed upwards. The hollow disk F is held above the mouth by means of the vaporizing tubes C H, and the eye bolt C_3 screwed in a boss in the bottom of the casing K. The adjusting needle B is provided with a handle at a distance from the heat to more conveniently operate it. The flame passes along the casing E from the nipple A_1, the vaporizing tubes C. H, is deflected and spread on the dished disk F, at the same time conveying more heat to the vaporizing tubes. The flame is controlled by the screw adjuster B as well as by varying the pressure of the air upon the oil in the tank.

King Edward's 22 horse power Daimler is at present being fitted with solid rubber tires on the rear wheels instead of pneumatic, to prevent delays on the road.

By way of testing the efficacy of crude petroleum as a dust laying agent, the *County Gentleman* (English) has offered to pay the expenses of sprinkling petroleum on a mile or two of main road in England, subject, of course, to the consent of local authorities.

An international automobile tour to Algiers is being spoken of for the coming winter, under the patronage of all the leading national automobile clubs.

The *Pall Mall Gazette*, of London, declares that speed is no test of danger, as a slow machine in unskilled hands is the most dangerous, and it maintains that 30 miles an hour by a skilled driver is a reasonable standard.

The Daimler Works of Cannstadt, according to the *Allgemeine Automobil Zeitung*, have declared that if entrusted by the German Automobile Club to represent it in the Gordon Bennett 1903 cup race they would undertake the task and build three special cars.

The Duke of Marlborough has fitted his 15 horse power Mors with an arrangement, designed by himself, which takes the form of an indicator on the dashboard similar to the telegraph used on board ship. On the dial are directions to stop, go on, turn to the left or right, go slower or faster, turn right around, etc. By means of an electric button the Duke, serenely seated in the shelter of the limousine body, is able to

direct the driver without exposing himself to the weather.

A service of automobile buses was inaugurated at Birmingham, England, Saturday, September 6.

Ras Makonnen has taken a 12 horse power automobile and two motor cycles home to Abyssinia with him.

The South African Motor Car Company has been organized at Capetown to trade in automobiles and operate automobile services.

The British Postmaster General has decided to send a representative to the Automobile Club's trial of motor delivery vans.

An exposition of alcohol motors and other alcohol using apparatus takes place at Madrid, Spain, during the month of October. Gold, silver and bronze medals will be awarded.

There were thirty-six entries in the Semmering hill climbing trials, held by the Austrian Automobile Club September 7. They included four locomobiles, a Darracq, a De Dion-Bouton and C. Gray Dinsmore's Mercedes.

A bill to regulate the storage and sale of gasoline for automobiles is to be introduced at the next session of the British Parliament. The attention of the Home Office has been directed to the subject by the London Fire Brigade.

In the automobile races at Frankfort-on-Main, Germany, on August 31, the event for large vehicles was won by Werner, who drove C. Gray Dinsmore's 40 horse power Mercedes machine. The time for 10 miles was 14 minutes 6 seconds.

The motor car is to oust the horse, it seems, by robbing it literally of its foothold in the London streets. When the roads, from lack of sand, have become so slippery that it is altogether impossible for any horse to stand then will the triumph of the motor be complete.—*London Express.*

It is said that the Shah of Persia dreads high speeds, but delights in seeing others indulge in them, and being aware of this the Automobile Club of France during his recent sojourn in Paris organized a race at Longchamps for his edification. Serpollet on this occasion made a kilometre in nearly record time.

Sir Frederic Abel, an English scientist, died at his home in Whitehall Court, London, on September 6, in his seventy-sixth year. His labors in connection with the testing of petroleum are well known. The fixing of the flashing point of 73° was the result—one which can hardly nowadays be said to inspire complete confidence; but the agitation against which is, probably, of a mixed character.

La Locomotion states that Léon Bolleé, being backed financially by Vanderbilt, is building a small number of the highest grade of machines (type Mercedes), which will cost about 30,000 francs each, and are intended particularly for the American market.

The annual hill climbing contest of the A. C. F. will be a double event this year. There will be one trial at Chateau Thierry on September 28 and a second one at Gaillon on October 5. The times for the two trials will be added to decide the championship in hill climbing.

It is now claimed that all the remarkable records made at the recent Deanville races were due to an error in the timing. Gabriel, for instance, instead of having made a speed corresponding to 136 kilometres per hour only made 108 kilometres, and all the records will probably be annulled by the A. C. F.

At a recent club run of the Manchester (England) Automobile Club a vehicle ran over a duck in the road, and it was highly amusing to witness the owner, holding the duck, which she said was the pet of the family, in front of her by the neck when she afterward appeared and demanded restitution. This was at once given in a novel way by an impromptu auction, at which the duck fetched 2s. 6d., to the evident satisfaction of the owner.

In regard to the British Automobile Volunteer Corps it is further learned that over 100 applications for membership have already been received and that circulars are being sent out to owners of cars with a view to securing recruits.

The desire is to enroll as large a number of gentlemen as possible who are willing to register one machine or more for military purposes when required, and to drive or parade a driver for the same.

In times of peace the duties of the corps will be to take part in manœuvres and to convey staff officers on tours of inspection. In case of war the corps may be further called upon to carry dispatches, transport signalling and ballooning apparatus, and to move light machine guns.

It is suggested that the owner of a car, when an expert driver, shall rank as an officer, while chauffeurs are to be ranked as sergeants. When on duty officers will be granted 30s. per day and fuel for the motors.

Although the suggestion has gained considerable popularity among motorists, those proposing to join the corps do not take kindly to the idea of camping out during the period of training, but desire to be permitted to take up their quarters in the nearest hotel.

United States Customs Regula

The A. C. A. has sent to its m
a circular stating that through the
of the American Automobile Asso
and the Automobile Club of Ameri
matter of the importation and expo
of automobiles into and out of this
try under the present rulings of the
ury Department stands as follows:

FREE ENTRY OF AMERICAN BUILT A
BILES, EXPORTED AND RETURNED

An American built automobile r
taken abroad and, provided it h
been advanced in value or impro
condition by any foreign made
ments, may be brought back again
duty.

An owner desiring to take his Ar
built automobile abroad should
from the custom house at the point
parture an outward bound clearan
fore returning to this country, he
obtain from the United States co
the point of departure an inward
clearance and a declaration made
the said consul of the fact that th
mobile was exported from the
States and that it has not been ad
in value or improved in condition
process of manufacture or other me

FREE ENTRY OF REIMPORTED FOREIGN
AUTOMOBILES.

An automobile of foreign manu
having been brought into this coun
duty paid at the time of importatic
be taken out of the United States
abroad and is exempt from duty
importation, provided it has not b
vanced in value or improved in cc
while abroad.

An owner desiring to take his
built automobile abroad should reg
at the custom house before it is tal
of the United States, and furnish
tory evidence that the duty was p
paid at the time of the first imp
(application should be made pe
and can be made without the inter
of a custom house broker). A ce
will thereupon be issued to the ow
upon its return the automobile, ful
tified, will be admitted free of duty

FREE ENTRY UNDER BOND OF AUTOMO
TOURISTS (NOT CITIZENS OF THE U
STATES) FOR TEMPORARY USE

The regulation permitting the fr
of bicycles of tourists brought i
country for temporary use, not ex
three months, has been extended
include automobiles brought by
from abroad for a stay of not ex
three months. In such cases form
is required, a careful examination
praisement is made at the point of
tation, and a bond satisfactory to
tom authorities, with penalty in do
estimated duties, must be given
importer, providing for the due
tion of the automobile covered
within three months from the date
when such bond shall become r
void; otherwise to remain in full fo

R. H. Macy & Co.'s Combination Truck.

R. H. Macy & Co. are now using in their delivery service a large wagon furnished by the Fischer Motor Vehicle Company, of Hoboken, N. J.

This wagon carries a load of 5 tons and is of the regular Fischer combination type, having a four cylinder gasoline engine of 18 horse power, which acts in conjunction with a storage battery of forty-eight cells.

The speed of the wagon is between 6 and 7 miles an hour, and it is claimed for the batteries that they will move the load without engine connection for a period of two hours.

The operator stated that he had, at the request of Mr. Straus, of the firm, run with his 5 ton load from the corner of Spring and Varick streets to Macy's store at Fourteenth street and Sixth avenue without engine connection, and in so doing had only pulled down the battery power from 109 to 102 volts.

The gasoline capacity is 30 gallons and the water tank is of equal size.

The length of the wagon body is 17½ feet over all, with an inside carrying area of 12x5½.

The general construction and arrangement of the engine and battery outfit are similar to that of the other Fischer wagons already described in THE HORSELESS AGE.

H. L. Jespersen, manager of Macy's automobile department, informs us that they propose to follow closely the question of automobile delivery, and are prepared to examine the merits of different types of vehicles with a view to utilizing those best suited to their wants.

Automobiles in Algeria.

The United States Consul at Algiers reports that the automobile is fast displacing the horse in that country. The country, he says, is well adapted to the automobile, both on account of its excellent roads and the steep grades which are encountered there.

The consul particularly mentions the fact that the Government has constructed roads far into the country, which are kept in good repair. The introduction of the automobile, he asserts, has nearly ruined the trade in Arabian horses.

An "Autogun"!

The New York *Herald* of Sunday, September 21, publishes an account of the invention by Robert H. Austin, of Stamford, Conn., of an "autogun," designed to shoot a rope or cable across a road and prevent the passage of scorching automobilists.

"In its primitive form it looks not unlike a long cartridge shell set on a wooden base. A spring enters this shell, and upon the spring is set an 'arrow,' to which is attached the cable. When the spring is compressed and locked by a simple lever the 'autogun' is loaded. A slight pressure against the lever discharges the gun and the arrow flies from its mouth, carrying with a long tail of cable. He has taken steps to have it patented, and proposes to put it on the market."

This properly belongs in a humorous column.

Legislative and Legal.

An auto ordinance is to be passed at Geneva, N. Y.

An auto speed ordinance is being drafted at Stockton, Cal.

All the towns along the pike below Philadelphia on the road to Wilmington are agitating for speed restriction.

Erskine Sunderland, an architect of Washington, D. C., who was arrested last Thursday for alleged violation of the auto law, states that he will test the validity of the law.

Morris Pratt and H. M. Adams were arrested at Oyster Bay, L. I., last Friday for alleged violation of the Cocks law. Adams paid $10 fine and Pratt's case was adjourned until October 1.

Mayor Higgins, of Racine, Wis., has vetoed the 6 mile an hour auto ordinance which recently passed the council, on the ground that the limit is too low. He favors at least 8 miles an hour.

W. Watts Sherman, Newport, R. I., whose chauffeur was recently placed on trial for illegal speeding and pleaded not guilty, has taken an appeal and is reported to be determined to test the validity of the law.

The date of the hearing on the proposed ordinance to license automobilists, now before the New York board of aldermen, has been set for October 7. The ordinance is sponsored by the League of American Wheelmen.

Growing out of the fatal fire in an automobile at Roger Williams Park, Providence, R. I., last July is a suit for $3,000 damages brought in favor of one of the victims. The contention is that the vehicle was unsafe.

Bay City, Mich., has about decided on an 8 mile limit downtown and a 10 or 12 mile limit in the outskirts, while Ann Arbor has limited the speed to 7 miles an hour between streets and 5 miles at crossings. The fine is $25.

The board of freeholders of Middlesex County, N. J., abandoned the proposed ordinance forbidding the use of county roads to automobiles at all hours except between 10 a. m. and 4 p. m. and have adopted one restricting the speed of autos to 12 miles an hour.

Blum Brothers, who were found guilty of negligence in causing the death of Richard Henches and the serious injury of John Krieger at Hackensack last May by running their automobile at excessive speed along the highway, have settled by the payment of $2,000 to the heirs of the first and the same sum to the surviving victim.

The Elizabeth, N. J., council has passed to the second reading a supplementary auto ordinance requiring all persons using automobiles in that city to register their names with the city clerk and be given a number, which shall be painted in large letters on the back of each vehicle. Failure to obey this rule is punishable by a fine of $10. In cases of accident automobiles must be stopped and names exchanged. Lights are also required in autos from one hour after sunset to one hour before sunrise.

Judge Garretson, of Somerville, N. J., in his charge to the grand jury of Somerset County, September 23, referred to the recent fatal accident at Bernardsville to Mrs. W. V. Snyder, of Newark, and told the jury it was their duty to investigate the accident thoroughly, and if they found that the automobilist who caused the runaway was guilty of excessive speeding on the highway they should present the operator by indictment for manslaughter.

Automobile Accidents.

Emile Giese and his son, machinists, North Bergen, N. J., were injured by the overturning of an auto they had been repairing.

W. P. Schippman, of Jersey City, and a companion met with an accident caused by a loose tire while on the way to New Brunswick at moderate speed.

E. C. Stilwell, of Chariton, Ia., had his leg broken in two places by the running away of an automobile due to the displacement of a lever as he was entering the vehicle.

An automobile belonging to G. G. Tyson, Riverside, Conn., became unmanageable at Dobbs Ferry, N. Y., the other day, collided with a carriage and seriously injured its occupant.

In passing over a muddy spot in the road at Poughkeepsie, N. Y., recently an automobile skidded and collided with a telegraph pole, breaking the steering gear and springing the axle.

As two ladies were riding up hill in an automobile at Stamford, Conn., last week the chain broke and the machine began to back down hill. The brake failed to work and both occupants were injured.

Homer Crosbie, an octogenarian, was fatally injured at Pomeroy, Ohio, recently by the upsetting of an automobile driven by his brother, Lennox Crosbie, of Murray City, Ohio, inventor of the machine. The chain came off the sprocket as they were climbing a hill, and there was no brake to apply.

D. C. Williams, who was making a trip by automobile from Chicago to Boston, came to grief near Batavia the other day, when he is said to have been racing with a New York Central express train. He lost control of the machine and ran off a bridge. He saved himself by jumping, but his machine was wrecked.

The sale of the property of the Automobile Company of America has been confirmed by the court.

MINOR MENTION

H. C. DeLoura is moving his automobile factory from Fort Madison to Perry, Ia.

A branch station of the Harvard system has been opened on Winthrop street, Salem, Mass.

The Henry Ford Company, of Detroit, Mich., has been changed to the Cadillac Automobile Company.

Quite a number of abandoned automobiles, found standing in the street, are being reported from various parts of the country.

A new steering handle made of rubberoid, a substitute for hard rubber, is being placed on the market by the American Enamel Company, of Providence, R. I.

R. W. Whipple, Binghamton, N. Y., writes that an automobile club is an early possibility there. The 7 mile an hour auto ordinance still holds in that city.

The Daimler Manufacturing Company, Steinway, Long Island, have received an order for another wagon from the Society for the Prevention of Cruelty to Animals.

Joseph Schmidt, Jr., has invented a new transmission gear for automobiles, which is manufactured by the American Gasoline Motor Company, 69 Jackson boulevard, Chicago, Ill.

The Massachusetts Automobile Club are putting a turntable in their storage room to facilitate the handling of the long cars, which are displacing the short wheel base of one or two years ago.

The Hydra Double Battery Company, of New York, manufacturers of a dry battery used by automobile builders, has gone into receiver's hands with assets of about $4,000 and liabilities of $62,000.

Secretary S. M. Butler, of the A. C. A., announces that Rule VI of the Reliability Run has been amended by striking out class D—motor cycles—and all other provisions in reference thereto.

The Grosse Point (Detroit) automobile races, which were originally planned for Friday and Saturday, September 19 and 20, have been postponed until September 29 and 30 in consequence of the heavy rains.

The Fournier-Searchmont Automobile Company chartered a special train on the Pennsylvania Railroad recently to take their employees down to the new factory at Trainer Mills, 16 miles from Philadelphia.

Plans are on foot for the enlargement of the plant of the Jewell Storage Battery Company, Pittsfield, Mass., and a new corporation composed of Boston capitalists will buy the rights of the manufacture and sale of the goods in New England. Mr. Jewell is now in Boston exhibiting a 6 horse power crude oil engine, which has a number of improvements over the first machine built by the company.

Alfred B. Harrington has acquired the automobile storage and repair station of Patterson & Shaw, 58 Schermerhorn street, Brooklyn, N. Y. He will continue to handle the Elmore gasoline carriage, and has also taken the agency for the French Decauville car.

According to the Memphis *Scimitar* the Industrial League of that city has a proposition from a large automobile manufacturing concern to establish a branch factory there, to supply Southern trade, on condition that sufficient stock be taken locally to build and operate the plant.

The Elmira *Daily Press* is authority for the statement that gasoline automobiles are to be manufactured at the Elmira plant of the International Fire Engine Company, of which George R. Bidwell is president. Three hundred machines are to be turned out "within the next six months."

The steam express wagon operated by the Adams Express Company in New York city the past two months was recently seen on board one of the Pennsylvania ferryboats crossing the North River, and we also learn that the engineer of the White Star Steamship Company, after inspecting the wagon, granted a permit giving it access to its docks.

The International Wheel and Rubber Tire Manufacturing Company has purchased the plant of the Rubber Goods Manufacturing Company, on Washington street, New Brunswick, N. J., and will soon begin the manufacture of automobile and vehicle tires. The authorized capital of the company is $3,000,000.

The Standard Motive Power Company, of Canal Dover, Ohio, has been capitalized under Arizona laws with a capital stock of $10,000,000, of which $1,500,000 is subscribed, to manufacture locomotives, motor cars, etc. The officers are: Howard MacNutt, president; Andrew Weis, vice president; W. H. Hoar, secretary; Thornton Chase, treasurer.

The Webster Automobile Company, of 10 West Sixtieth street, New York city, have just increased their premises considerably, now occupying the whole of the ground floor and having storage facilities for at least thirty vehicles. The new Webster gasoline tonneau car, four cylinder, of 16 horse power, is said to have proven entirely successful, and a number will soon be on hand for sale. A cut and description of this car will appear in the next issue of THE HORSELESS AGE.

Charles J. Glidden, of Boston, recently passed over the St. Gotthard Pass, in Switzerland, on his Napier carriage. This is roughly a climb of 10½ miles, and then there is a descent of 8 miles. Mr. Glidden and his party had quite an interesting time, as they made the ascent in a blinding snowstorm, with a howling gale raging at the top. They stopped for a momentary breather, and then found the petrol had frozen, or, rather, the vapor had frozen in the pipe, so they made the descent with the engine stopped.

To Curb the Automaniacs.

The Long Island Highway Protective Society, the incorporation of which at Albany, N. Y., was recently noted in our columns, held its first meeting at 60 Pine street, New York, last Thursday, and elected the following officers: Charles W. Wetmore, president; Robert W. De Forest, vice president; W. Emlen Roosevelt, treasurer, and Townsend Scudder, secretary and counsel.

Committees were appointed on law and on legislation, and by-laws were adopted.

Mr. Wetmore, chairman of the Oyster Bay division of the society, reported the work done by that division during the past month. He stated that six arrests had been made by the agents of the society and that all arrested had been fined. Of the six, five pleaded guilty and one, the chauffeur of W. D. Guthrie, pleaded not guilty, and on trial was convicted and fined. In addition to the arrests made Mr. Wetmore said many had heeded the society's warning, reduced their speed, and thus avoided arrest.

The society then indorsed the work of the Oyster Bay division and authorized its continuance along the same lines. It was thereupon decided to start divisions of the society in each of the towns and wards in Queens, Nassau and Suffolk counties, in order that these districts might be freed from reckless drivers of machines.

The annual membership fee of the society was fixed at $5 and an invitation was extended to all in sympathy with its objects to affiliate. Offices were opened at 7 Pine street, New York.

When seen after the meeting Secretary Scudder said:

"There is no desire on the part of the society to antagonize the legitimate enjoyment of the highways by automobilists. The society is not against the automobile, but against its reckless use, and until offenses against the rights of the people on the roads by chauffeurs cease the society will conduct a relentless war upon all such offenders. This society is organized for business and means business, as its work already shows. We will collect legal evidence against all offenders and will prosecute them to the full extent of the law regardless of influence and social position. Defiance of the law no longer will be tolerated."

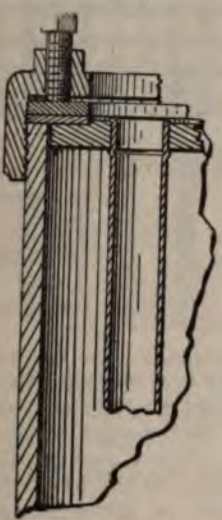
By unanimous vote the Newark, N. J., board of works last week passed, over the mayor's veto, an automobile ordinance requiring owners of these vehicles to register them with the county clerk and fixing penalties of from $10 to $25 for violation. The mayor contended that the board had no right to fix a heavier penalty for breach of an automobile law than for breach of a bicycle or horse vehicle ordinance, and that the board had no power over the county clerk. All owners of automobiles in Essex County must now register their machines with the county clerk.

MOTOR VEHICLE PATENTS..

United States Patents.

709,032. Steam Boiler.—Charles Olson, of Grand Rapids, Mich. September 16 1902. Filed March 26, 1902.

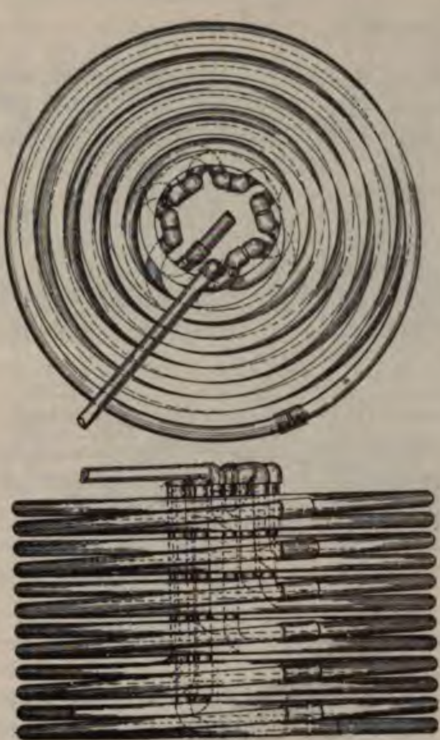
The invention relates to fire tube boilers.



and aims to provide means for taking these boilers apart for cleaning and repairs. The boiler consists of a plain tubular shell externally threaded at the ends, internally threaded caps having large central openings, set screws at regular intervals in the caps, removable heads in the shell, flues connecting the heads, and arranged in a circle equidistant from the peripheries of the heads, gaskets covering the seams between the heads and shell, and yielding rings engaging the gaskets and engaged by the screws.

709,042. Steam Generator or Water Heater.—Charles M. Raymond, of Cleveland, Ohio. September 16, 1902. Filed March 17, 1902.

A flash or semi-flash boiler for automobiles of the type in which the water is fed to the uppermost of a series of superposed coils of pipe and the steam issues at the lowest. The boiler comprises a plurality of pairs of helical pipe sections made of tubing and arranged, respectively, in a horizontal plane and a short distance apart vertically. The outermost coils of the two sections of each pair of helical sections are joined together, and are in open relation with each other, and the innermost coils of the helical sections have, respectively, an extension projecting upwardly above the uppermost helical section. The upward extension of the inner coil of the lower section of each pair of helical sections forms the inlet of the pair of sections, and the upward extension of the innermost coil of the upper section of each pair of helical sections constitutes the outlet of the pair of sections. The inlet forming upward extension of the innermost coil of the lower section of the uppermost pair of helical



sections is connected and in open relation with the feed supply pipe, and the inlet forming upward extension of the innermost coil of the lower section of each remaining pair of helical sections is connected and in open relation with the outlet forming upward extension of the innermost coil of the upper section of the pair of helical sections next above. The outlet forming extension of the upper section of the lowermost pair of helical sections connects and is in open relation with the steam pipe.

709,062. Steam Engine.—Nicholas J. Verret and Henry N. Samstag, of Little Rock, Ark.

709,115. Generation of Motive Power. —S. A. Rosenthal, of London, England. September 16, 1902 Filed December 21, 1901.

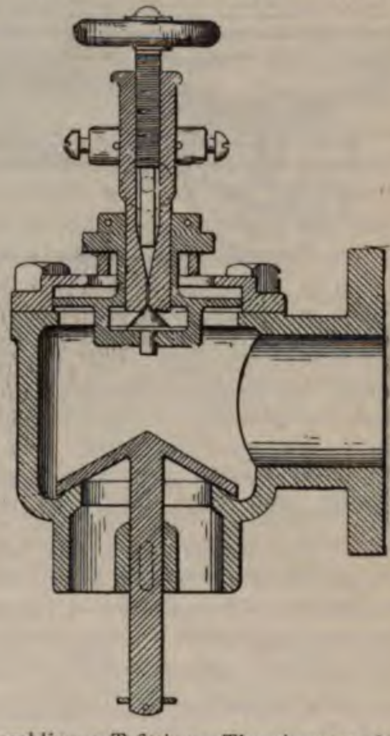
The invention relates to a process in which a volatile liquid having a low boiling point, high vapor tension and low latent heat of vaporization is added to the water in the generator. Such liquids as acetone, petroleum, ether or methyl alcohol may be used for the purpose, and when added to the water in the generator in the proportion of .1 to .2 per cent. its tension is increased and steam is generated with a less expenditure of fuel than would ordinarily be required.

709,124. Brake Mechanism for Motor Vehicles.—John Unser, of Carthage, N. Y. September 16, 1902. Filed March 8, 1901.

The brake of this invention acts directly on the tires of the wheels, and is operated by steam pressure, being intended for steam vehicles only. A steam cylinder is fastened to the rear part of the body, centrally below it, and a piston within this cylinder is connected through a piston rod and equalizing lever to arms on the two brake shafts respectively. A valve near the cylinder controls the admission of steam thereto, the valve being operated from the seat. The valve is of such construction that when it shuts off the steam it opens the cylinder to the atmosphere. A spring within the cylinder brings the piston back to the extreme inward position, and thus releases the brake.

709,126. Vaporizing Device for Explosive Engines.—Benjamin C. Vanduzen, of Winton Place, Ohio. September 16, 1902. Filed July 13, 1896.

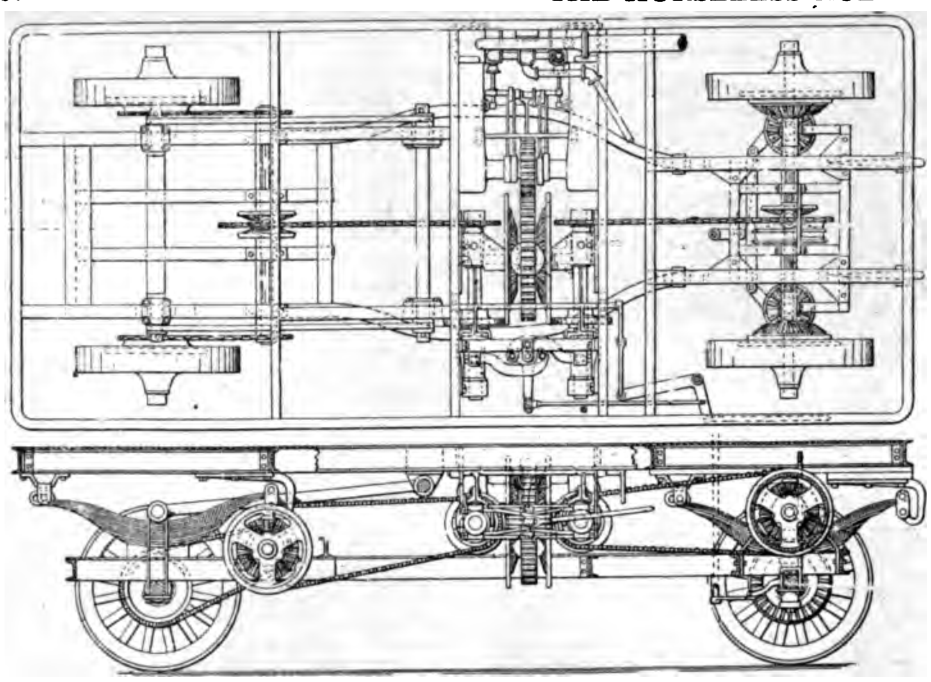
This vaporizing device has a number of peculiarities. It consists of a body casting



resembling a T-fitting. The air enters into the device through the bottom arm, through a suction operated valve with conical head. The gasoline is fed on top, and the mixture leaves through the lateral opening. The interesting feature of the invention is the method of feeding the gasoline.

The bolted top plate of the valve body is provided with an arch, supporting at its middle a vertical column. This column is drilled and provided with a needle valve for shutting off the gasoline which arrives through a hollow arm extending laterally from the column. The lower end of the opening through the columns is normally closed by a conical plug, as shown. This plug is supported by a movable piston, which is free to move up and down in a cylindrical chamber in the cover of the valve body. This piston has a central projection extending through the cover, the extreme end of the projecting being provided with a collar. A spring always tends to lower the piston, and thus allow gasoline to flow into the device, but a reciprocating wedge engaging with the collar on the piston projection controls the motion of the piston. The wedge is reciprocated from the crank shaft of the engine.

708,949. Motor Vehicle.—Edgar A.

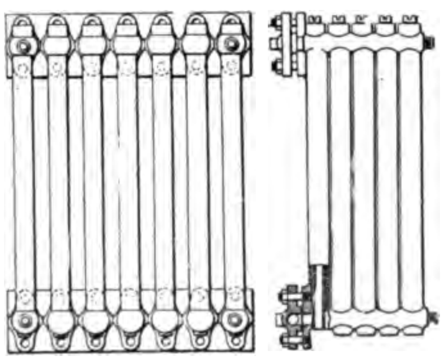


No. 708,949.

Wright, of Canton, Ohio. September 9, 1902. Filed December 13, 1900. A steam truck in which the boiler is located in front, as usual, and the engine under the platform frame, but the latter, contrary to ordinary practice, is arranged transversely. The engine drives through spur gears a compensating gear, which insures an equal tractive effort on both front and rear wheels. The vehicle has a four wheel drive and chain transmission to two countershafts, one in front and one in the rear. The front countershaft is connected to the front wheels through bevel gears, and the rear countershaft to the rear wheels by chains. Further details of construction are given by the two general views of the vehicle herewith reproduced.

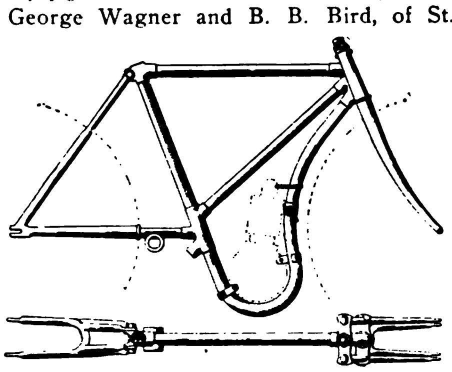
709,371. Steam Generator. — Peter Stoltz, of Berlin, Germany. September 16, 1902. Filed October 26, 1901.

The generator consists of several groups



of tubes connected together, whereby the adjacently disposed longitudinal tubes and the cross passages for connecting the ends of the latter with each other in each group of tubes form an undivided structure. These groups of tube elements may be produced by casting, rolling or forging, first the external form of the groups of tubes, and then by boring out the longitudinal channels or passages for forming the vaporizing spaces, and, finally, the cross passages which connect the longitudinal channels. In constructing a steam generator in accordance with this invention several such elements of groups of tubes are disposed side by side and connected with one another. The tubes may be disposed so close together as to have combined walls at the adjacent parts, thereby preventing distortion of the tubes and rendering the whole boiler compact and light, while, furthermore, the resistance of the tube groups is increased and greater rigidity imparted to the generator.

709,380. Frame for Motor Bicycles.—George Wagner and B. B. Bird, of St.

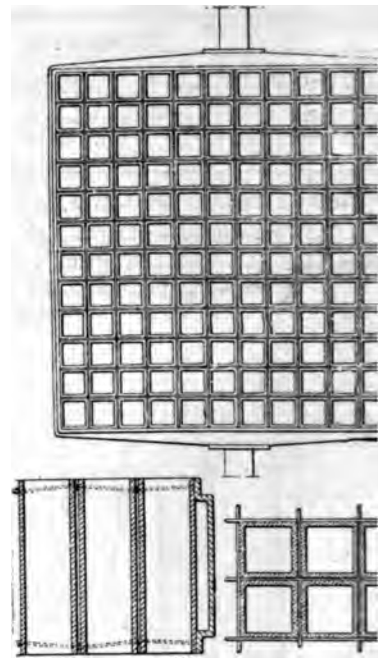


Paul, Minn. September 6, 1902. Filed April 5, 1902.

Relates to an improved motor frame and fork for the same arranged to carry the motor in a loop immediately back of the front wheel and below the centres of the wheels within a short distance of the ground, to distribute the weight of the motor equally between the wheels, and to allow proper and easy steering of the machine, at the same time protecting the rider from the oil and heat of the motor.

709,416. Cooling and Condensing Apparatus.—Wilhelm A. Maybach, of Cannstadt, Germany. September 16, 1902. Filed March 28, 1901.

The cooling and condensing apparatus consists of a frame having a network at each end, consisting of wires which may be interwoven, as shown, or may simply



be arranged to cross each other. Th are so strung on the frame as to series of quadrangular openings c form size. Tubes quadrangular in section snugly fit the quadrangular ings formed by the wire mesh. tubes extend through the quadra openings formed by the interlacing wires, and the wires space these tube ciently so that there will be very vertical and horizontal channels b each of the tubes. When the tubes position, the ends of the tubes are sc or otherwise secured to the wires fo the screen or network, and a coolin sel is thereby formed which is wate and so formed that when water is into the apparatus through the pi top it circulates throughout the entir of the cooling apparatus and through the pipe below.

709,265. Transmitting Mechar Charles W. Hunt, of West New Bri N. Y. September 16, 1901. Filed N ber 30, 1900.

709,125. Brake Mechanism for Vehicles.—John Unser, Carthage. September 16, 1902. Filed Octob 1901.

709,136. Roller Bearing.—Claren Carman, Bayshore, N. Y. Septeml 1902. Filed January 17, 1902.

709,157. Jar for Storage Batteries. rick Kennedy, Brooklyn, N. Y. S ber 16, 1902. Filed January 6, 1902.

709,205. Electric Condenser and M of Making Same.—Henry P. Cl Chicago, Ill. September 16, 1902. April 6, 1901.

709,206. Ball Bearing.—Harley well, Lakeview, Mich. September 16 Filed October 9, 1901.

709,322. Roller Bearing.—Albe Henderson, Toronto, Canada. Sept 16, 1902. Filed July 20, 1901.

709,441. Roller Bearing.—Albe Henderson, Toronto, Canada. Sept 16, 1902. Filed June 5, 1902.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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THE HORSELESS AGE.

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Legislative and Legal.

As a contribution to the cause of uniform and reasonable automobile legislation we shall issue on November 5, our seventh anniversary, a special number entitled "Legislative and Legal," dealing quite fully with the subject of auto legislation in the United States and European countries, with particular reference to our own country, where the question is now uppermost in halls of legislation and where in nearly all localities where automobiles are used a strong sentiment for the restriction of speed exists among the people. There is little doubt that the coming winter will see the matter taken up by many of the State legislatures and city and county councils, and it is to provide a complete digest of the subject, showing both sides of opinion, giving the text of the existing foreign and home laws with the results of their operation and calling attention to the myriad local laws which now entangle the touring automobilist, that the forthcoming special has been planned.

A feature of the issue will be as complete a digest as we can compile of the local automobile ordinances in every State of the Union. Another will be letters and interviews from leading exponents of opinion in automobile and legislative circles, on both sides of the controversy. We wish to make it in the widest sense representative, and to this end invite contributions from any of our readers who have suggestions to make in regard to this timely question.

The Reliability Trials.

An important change has been made in the rules of the New York-Boston and return reliability trials, reducing the maximum average speed from 15 to 14 miles an hour, and thus avoiding the necessity of violating the State laws in order to obtain full reliability marks. This increases the time for the mile from 4 minutes to 4.285 minutes and changes all the minimum times in the various stages.

The change certainly ought to meet the approval of all contestants, as it must be admitted that an average of 14 miles an hour over such long distances is all that is required and as there would be absolutely no sense in encouraging unlawful speeds.

To add to the interest in the trials "reliability" prizes in the form of cups have been offered by President Shattuck and each of the three members of the contest committee. The president's cup will go to the contestant earning the highest number of reliability marks and the other cups to those making the second, third and fourth highest number of reliability marks respectively. In the calculation of the reliability marks one mark will now be deducted for every minute the vehicle occupies in making the journey above the time corresponding to an average of 14 miles per hour.

The entries at the time of this writing had reached seventy-five, and as the time of entry has been extended it is not improbable that the list will still be increased. But the American industry is already thoroughly well represented. It ought to furnish food for reflection that among the seventy-five entries there are only six foreign machines. In the English trials about 40 per cent. of the contestants were foreign.

Automaniacs, Beware!

At length the Automobile Club of America seems to be bestirring itself and endeavoring to do something to put a stop to the violations of the speed laws which have been openly flaunted by some of its members. Last week when it was announced in the New York papers that certain young automaniacs intended to break the record from St. George, Staten Island, to Atlantic City, N. J., in their automobiles, the club officials notified the authorities en route of the proposed speed trial and put a stop to it—if it was ever seriously considered.

This is very good as far as it goes, but we believe a more effective curb would be the suspension and, if necessary, expulsion of prominent members who have been repeatedly reprimanded or fined for excessive speeding and who openly defy

the law and public sentiment. The gravest offenders are those whose wealth and position make them leaders of the fad worshipping set, which unquestioningly follows their bad example and holds them up in justification. These have their fun and go scot free, the imitators argue, then why should we hesitate to break the law?

Let the leaders of the automaniacs be brought to book and a wholesome lesson will be learned by all.

Effect of Altitude on Gasoline Motor Power.

A French contemporary makes the curious blunder of asserting that motors intended for use in high altitudes must be provided with larger air intakes than those for ordinary purposes. It is, of course, well known that the density of the atmosphere decreases as one ascends and that in consequence a gasoline motor takes smaller charges of air at a high altitude. But this fact cannot be altered by increasing the size of the air intake. If the admission valve and its piping are large enough to admit of the cylinder being filled with a charge at practically atmospheric pressure in ordinary altitudes, they are large enough to admit a charge practically equal to the atmospheric pressure in high altitudes, and that is all that can be done. As long as suction is depended upon to draw in the charge the pressure of the latter at the time the intake valve closes can never be above the atmospheric pressure in that locality.

On the other hand, the fact that gasoline motors are less powerful in high altitudes is of little consequence from the standpoint of the automobilist. He will have very rarely occasion to use his machine in parts more than 2,000 feet above the sea level, and at that height the rarefaction of the air is only slight.

The English Reliability Trials.

Although the American automobile industry was not very largely represented in the English trials, the vehicles of American manufacture which did take part gave a thoroughly creditable account of themselves and made a combined record which is unapproached by either English or French machines. Among the seventy vehicles which started in the first of the trials there were seven of American origin—an Oldsmobile, two Whites and four locomobiles. The proportion of the American vehicles to the total was therefore one in ten. There were two vehicles which earned the full number of marks or made a perfect record each day—one English and one American (a White). One vehicle in two that made perfect records was therefore American. Of the total of seventy vehicles which started in the first run forty-nine finished in the last. Of the seven American vehicles which started in the first run six finished in the last, so that here again the showing of the Americans is above the average.

Generally speaking, the trials seem to have been quite successful, and all reports state that they show a great advance in the excellence of construction over previous trials. The feat accomplished by two cars—running 650 miles without a stop for repairs or adjustments—is certainly something remarkable. In this connection it is worth mentioning that the English firms whose vehicle made this record made an equally good record in last year's Glasgow trials. These records were, of course, made with regular stock machines or machines of closely similar design. The same firm this year has "tried its luck" in several automobile races, the Paris-Vienna among others, having designed a special type of racing vehicle for this purpose. In these events it absolutely failed. These facts certainly prove that the qualities of a manufacturer's regular stock machines cannot be judged by the failure (or success) of the same manufacturer's specially designed racers in racing events, and generally shows the endurance contest to be a much better contest of quality of regular vehicles.

There was no serious accident in the entire trials to occupants of the vehicles, nor to outsiders. One of the competing vehicles had a collision with a horse, in which the horse was so seriously injured that he had to be shot. In addition there were several collisions between competing vehicles, which, however, did not result in any serious damage.

The weather was rainy during the first days of the trials, but dry, and the roads dusty during the last days. Weather conditions were thus varied.

Jump Spark Ignition Without Trembler.

In an article in our last issue Mr. Bramwell suggested a new system of high tension electric ignition, which we commend to the consideration of all ignition experts. There is no question of the possibility of igniting a gasoline e this manner, the only question being whether the advantages of tem outweigh any disadvantages present.

The use of a governor to avoid of batteries for starting would h practicable, since the electric g must run strictly in synchronism engine, and friction drives are t excluded. The generator would be driven directly from the engi or through positive gearing so tioned that the gear multiplicati engine to generator shaft is a wh ber.

Means must, of course, also be to vary the time of ignition—i. time of the electric impulse in t erator—and this can be accompl a number of ways. In the first p of the gears might be provided spiral slot for a pin in its shaft, s the gear was shifted along its s dynamo armature would move to the engine crank shaft, and th the spark to occur for another po the crank. Secondly, the magne frame of the generator might be around its centre line, and lastly a larly movable magnetic bridge o between field and armature might ployed.

The reason that this method been employed so far is undoubt cause it is generally thought th netic induction in an iron core changed more rapidly by interrup energizing current than by varying sistance of the magnetic circuit. this idea is probably correct it w affect the practicability of the syst gested, since its advantages claimed to be in that line. It w matter if the generator and coil h a little bulkier if that would m bothersome trembler or buzzer superfluous.

The generator evidently would be a magneto, since without com no direct current for excitation obtained. A peculiar form of ge which has repeatedly been sugge ignition purposes, with touch spar prove the most suitable, since it exceedingly sudden and moment pulse of current and is extremely It consists of a horseshoe magne erably laminated) and a core sheet iron surrounded at its

oil of wire. One of these stened to the flywheel and ar-tionary and so located that at osition of the flywheel the sheet forms an armature across the the magnet, very close to the not quite touching them. As ure approaches the poles, or , the magnetic flux through it magnet increases exceedingly d this gives rise to a strong pulse in the coil.

re, of course, also a number of to this form of generator, chief hich is undoubtedly the large rough which the stationary part re to be moved to secure the rance of spark.

t Your Trust in Princes."

ain the unpleasant news is being that a personage of high stand-rned his back upon automobil-ime not a member of the *haute* t a "real prince of the blood," dul Azziz, Sultan of Morocco. recently bought an automobile nd has been using it for some is own country. Recently, ac-United States Consul Langer-ngier, he was spinning along a lawful speed, of course, for in-the Sultan is the sole law giv-in the country all directions he hauffeur were perfectly lawful—g to some cause, the chauffeur l of the machine and the latter stone wall, throwing both the the chauffeur out. The Sultan very slightly injured, but his s entirely upset and he is said to l it back to town, where he gave the royal blacksmith to go out oyal sledge hammer and reduce auto to smithereens. He also ssued an ukase forbidding all of ts to import and use automo-

se will probably be insignificant ts upon the progress of the au-novement in general, for Mo-not yet reached a stage of civ-here a country becomes ripe for rn ideas as that of mechanical ic. The incident shows, how-the conversion of royalty to the is not always of such great sig-s one might be led to believe wide publicity that is usually ch "conversions." Royalty is evidently too fickle and too much given to frills. The automobile industry may well profit by the Biblical caution: "Put not your trust in princes."

A Question Answered.

A reader and member of the trade writes as follows: "I have been reading through your papers and have lately noticed some articles which I really cannot see will do the trade any good; in fact, a friend of mine who has been rather enthusiastic in regard to automobiles called my attention to the article on 'The Item of Cost' in your issue of September 17, and states that he will now wait until machines cost less, as he could not afford to spend $2,608.49 for twenty-six months of automobile pleasure, as did your correspondent, Dr. Longacre. There may be some special reason for the publication of these articles that I cannot account for and should be pleased to have you advise me in reference to same."

In reply to this we take pleasure in stating that we had no *special* reason in publishing the article referred to—no other reason than carrying out our object in publishing an automobile paper, which is to furnish *reliable*, unbiased information of interest to automobile manufacturers, dealers and users. Among the questions of great interest to users is certainly that of cost. The facts in relation to this subject can only be arrived at by generalizing the experience of many users, as it is perfectly plain that the cost will vary in each individual case with the uses to which the vehicle is put and many other causes. It certainly would not do to suppress accounts of cases in which the cost has been comparatively high and publish only those in which it has been low, as that would give a false aspect of the whole subject. The public wants the actual "unvarnished" facts, and that our aim at furnishing these is appreciated by our readers may be gathered from the following extract from a letter received this morning:

"I have been a reader of your paper for the last two years. At first I took three or four automobile papers, but found that you covered the ground so thoroughly and impartially that I finally dropped them all except THE HORSELESS AGE."

Now as to a reader deciding to defer his purchase of an automobile because he cannot afford to spend $2,608.49 in twenty-six months for the pleasure, we are entirely unable to see by what form of reasoning he arrives at the conclusion that his expense will necessarily be at this rate. It was plainly stated that the gentleman whose expense amounted to the above figure has driven 14,000 miles on city pavements in the period of twenty-six months in his practice as a physician. A pleasure vehicle would probably not have been driven more than half that distance in the same time, and, besides, if a purchaser's means are limited he will most likely for pleasure purposes buy a smaller, less pretentious machine, and thereby reduce the cost. Our conclusion, then, is that the inference that it will cost exactly $2,608.49 to operate an automobile for twenty-six months is not at all warranted by the facts set forth in the article referred to; and we must absolutely decline any responsibility for erroneous conclusions drawn from honest and authentic facts appearing in our columns.

We would reiterate that THE HORSELESS AGE is published with a view of furnishing complete and reliable information on all subjects of importance to automobile manufacturers, dealers and owners. It circulates among intelligent classes, has a broad, consistent policy and cannot afford to avoid subjects which may at times be embarrassing.

Now, having answered this question to the best of our ability and, we hope, satisfactorily, we would pose our correspondent this question:

Which school of trade journalism do you, as a member of the trade, favor, the one which aims to set forth the full, unbiased truth about automobiles and to deserve the confidence of the public or the one which brazenly approaches you with the intimation that it will withhold the facts from its readers, "pull wool over their eyes," and asks your advertising patronage in compensation for this "service"?

State License Advocated.

At a meeting of the board of governors of the Automobile Club of America, held September 29, the subject of licensing automobile drivers came under discussion. It was decided to appoint a committee to act in conjunction with a similar committee from the Manufacturers' Association to advocate and promote a State license ordinance.

It was held that the State highway law expressly relieves automobile owners of any necessity of taking out licenses from a city or other local authority and that the proposed license ordinance now before the aldermanic law committee is illegal.

BEGINNERS PAGE.

Burners.

Steam carriages employ either gasoline or kerosene as fuel. In America gasoline is used with only few exceptions, but abroad kerosene is more generally employed. Before liquid fuel can be burned it must be vaporized and be mixed with air—the same as in explosive engines. The previous mixing of air is not absolutely necessary to burn the fuel, as in a gas light, for instance, gas unmixed is burned in contact with free air; but to burn the fuel to full advantage it must have mixed with it before it reaches the flame nozzle a part of the air necessary for combustion. This principle of burning gaseous fuel is called the Bunsen principle and burners designed upon this principle are called Bunsen burners. All steam carriage burners are (multiple) Bunsen burners.

The liquid fuel is vaporized by a device which is as a rule separate from the burner proper, and such devices will be described in a succeeding article.

Fig. 1 represents a common type of burner. It consists of a dish shaped stamping or casting A, called the burner shell, and a bottom plate B of sheet steel, the two being riveted together at their edges. Through the flat cylindrical case thus formed extend a large number of steel tubes, C C C, which are expanded into the shell and the base plate. Around the openings for the tubes in the shell there is a circle of small perforations. A tube D of large diameter, called the mixing tube, extends into the burner from one side and about to the centre thereof. The mouth of this tube outside the burner is flared and a nozzle E extends a short distance into the tube, the nozzle discharging the vapor which has been generated from the gasoline.

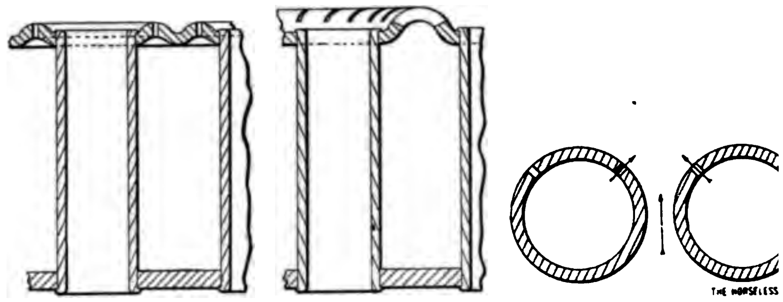


FIG. 3, 4 AND 5.

The vapor is discharged from the nozzle with a considerable pressure, due to air compressed in the fuel tank over the fuel and the vaporization of the gasoline. The suction created by the discharge of the vapor draws a certain amount of air into the mixer tube through the mouth of the tube around the nozzle. This air mixes with the gasoline vapor in the mixing tube and in the burner casing. The amount of air thus mixed with the vapor is less than is required to burn it completely.

The mixture of air and gasoline vapor issues from the burner case through the fine perforations around the air tubes, and burns in contact with atmospheric air, which rises through the air tubes C.

Fig. 2 shows a somewhat different design. The mixer tube in this case is located below the burner and communicates with the burner centrally at the bottom, through an elbow and an elbow connection. This reduces the height of the burner proper. F in this drawing is an open space in the burner for the insertion of a pilot light, to be described later.

The top plate of the burner, or the shell, naturally gets very hot and there is a tendency for it to warp and crack. Most of the efforts to improve burners have been in the direction of overcoming this difficulty. Instead of being made of steel, some burner shells are cast of iron and others of bronze. In Fig. 3 is shown a detail of a burner in which the top steel) is pressed with circular ridg the air tube openings and in w perforations are along the crest ridges. This improvement is cl prevent back burning (the perfor ing farther from the air tubes) a ing of the shell.

Fig. 4 shows still another con in which the shell (of cast iron) with concentric ridges or corruga tween which the air tubes are lo stead of perforations for the mixt are radial slits through the top o rugations. Freedom from deforr the heat of the flame and little l back fire are also claimed for this

Fig. 5 is a detail of a burner though embodying the same bu ciple as the preceding, is quite di construction. Instead of the air ing combustion rising through t the mixture being formed in a cas which these tubes pass, the n formed within a system of horizo ranged tubes and the air rises th spaces between the tubes. A mi is provided, as in the other bu tending entirely across the bu closed at its outer end. From extend on both sides tubes of length, such that their outer end a circle of nearly the diameter of under which the burner is to be u tubes extending from the mixing perforated, as shown in Fig. 5, o ted on top, the same as the co in Fig. 4.

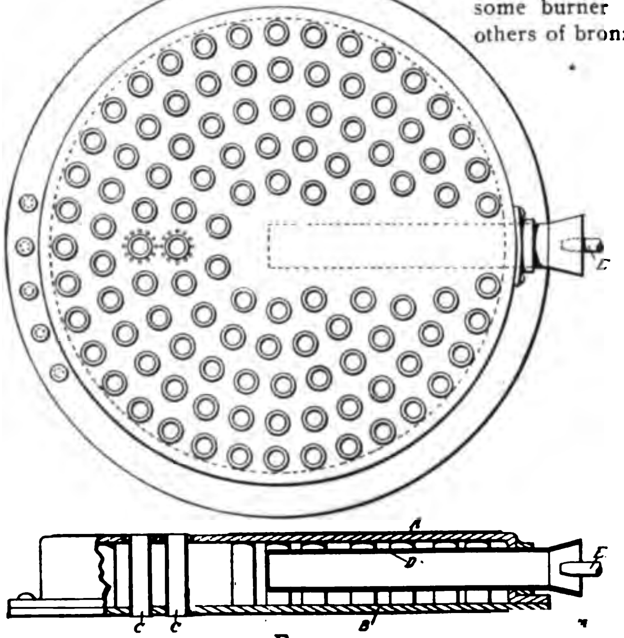


FIG. 1.

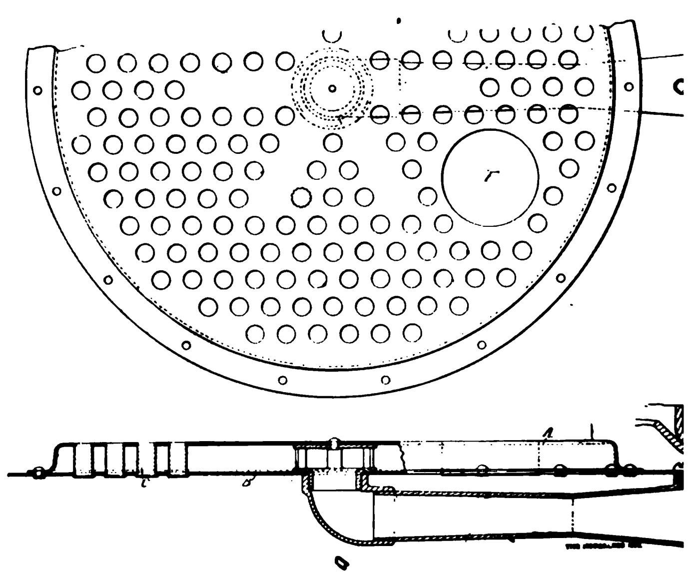


FIG. 2.

LESSONS OF THE ∴ ROAD ∴

Diary Notes of a User.

PART III.

By ***.

My machine, which has formed the subject of the experiences published some time since in these columns, was rebuilt by the manufacturers during the past winter. Its running gear had proved too stiff and inflexible, the wheel base was too short for easy riding, the steering gear was weak and defective, the engine showed no compression worthy of the name, and the transmission device had proved most unsatisfactory. The machine as remodeled has a longer wheel base, forced water circulation instead of the gravity system which had proved very inadequate, wheel steering in place of the tiller, jump spark ignition to replace the touch spark method previously employed, and three forward speeds instead of two.

After the diversified trouble which I had experienced with the machine as originally constructed, I not unnaturally hoped for a little fun with the remodeled masterpiece, which the factory characterized in a moment of pleasant hyperbole as one of the finest touring cars out. Visions of long tours through the mountains when distance should be annihilated and all care be dispelled constantly filled my mind, but after putting in seven months upon the machine and succeeding in driving it about 700 miles, these tours seem remote.

It was early in February that the renovated vehicle was received, and I immediately hastened to the freight depot, after stopping at the bank, to pay "the sight draft attached to the bill of lading." I was a little afraid to handle the new vehicle, as I had been informed by the factory as to its speed in figures which would not make a locomotive ashamed. They had also told me of a physician using a carriage exactly like mine, who drove constantly upon his middle speed, and who never had the nerve to brave the wild thrill of the high gear. I have since learned that this doctor simply made a virtue of a necessity.

SOME DEFECTS AND OMISSIONS.

However, I made bold to try to start the machine. There appeared to be gasoline in the tank and so I went through the starting preliminaries and did some cranking without avail. I could not succeed in making any gasoline appear at the carburetor overflow. After disconnecting the gasoline pipe from the carburetor, it appeared that no liquid could pass through it and it was immediately apparent that it was frozen. I then proceeded to heat the pipe with a blow torch—a somewhat risky proceeding—and soon had the engine started. The mud guards, which had been shipped separately, were put in place, and everything seemed nearly ready for a start, when it was found that, with the mud guards in place, the starting crank could not be operated. The guards were taken off on that side and loaded into the carriage. When filling the cooling system with water it was found that the draw off plug had not been sent along, and so a wooden plug had to be whittled to take the place. At length all was ready and I started up and ran the vehicle all right to the storage station, about a mile away. No means of lubrication had been provided for the circulating pump and so the factory instructed me to put on a grease cup. When the pump was taken off to do this, it was found that the pump vane had stripped the threads of the shaft upon which it was screwed. Instead of this vane's being keyed or pinned from turning upon its shaft, it was fastened in a far more ingenious manner. A hole was drilled into the end of the shaft, half in the shaft itself and half into the boss of the pump vane, and a machine screw was screwed into it. This screw had evidently jarred out, allowed the vane to turn on its shaft until it rubbed upon the side of the pump, and then the stripping of threads was but the work of an instant. I had the pump vane pinned upon its shaft properly and it has never given me any further trouble.

DEFECTIVE STEERING GEAR.

In taking the machine around the block to test it I made the discovery that the steering wheel would turn freely upon the column without doing any steering. Fortunately, however. I was not running at the time upon the fabulous high speed and no damage ensued. Any fair minded jury would, I believe, have brought in a verdict of manslaughter against the manufacturers of that steering gear, in case I had been killed. The steering wheel was screwed on the column right handed and supposed to be held there by a left hand jam nut, but the threads in the aluminum wheel had stripped, and thus put the gear in a most dangerous state. I put a good, honest steel key into the wheel hub and column, and it has not yet become corrupted by the company it keeps.

The sector of the steering gear which received its motion from the pinion on the steering column I found to be insufficiently supported. It was merely bolted to the thin white wood flooring of the carriage, which had split in line with the bolts, and every motion of the steering wheel was attended with an enormous amount of lost motion. I had a brace forged out which supported the sector upon the framing of the vehicle. All this time the engine had been inspected only very cursorily, but it was at once evident that it possessed

NO COMPRESSION

worthy of the name, as it could be turned over with hardly any effort when the relief cocks were closed. The cylinder head gasket had blown off before the vehicle had run 5 miles, although the factory had stated that the carriage had had a thorough test. The first time I took it out for a little running about the city I found out why that doctor never used his high speed. It was simply because the vehicle would not run on that gear except down grade or on the level under the most perfect conditions. The engine labored distressingly whenever I tried to take the least grade on the high speed.

Some time in April the factory answered my wails of distress and said they would send me an expert who would demonstrate the remarkable powers of the vehicle. He proved to be a very pleasant, sensible man and he put on his overalls and jumper and began to study into the mysteries of "one of the finest touring cars out."

THE CARBURETOR.

The carburetor of this machine is of the ordinary float feed type and the gasoline is sucked through a small aperture and strikes the flat end of a rod which is supposed to spread the spray perfectly evenly. When this carburetor was dissected it was found that the end of this rod had not been finished at all, but was just as it had been cut off; also, the thread on the rod which enabled the gasoline feed to be adjusted had not been cut down far enough to allow it to furnish a proper adjustment. I had previously made some complaint to the manufacturers about the action of this carburetor and had been told that its faulty action was due to the difference in altitude between the factory and my home. What will have to take the blame next, one wonders.

THE SPARK.

These defects were remedied at a machine shop and further cause of trouble was sought and found without difficulty. When the sparking outfit was inspected it was found that there was a considerable difference in the spark position of the two cylinders, a defect which was easily rectified. As the spark was very weak, the batteries soon fell under suspicion and were found to be practically worthless, although the carriage had not been run 10 miles. There were two sets of batteries furnished with the carriage and a double throw single pole switch, which must originally have been intended to throw one or the other of them into service. The manufacturers must have had an inkling of the early decline of both batteries, as they had wired them up in series on one side of the switch. These batteries were of the sealed variety, which requires to be inspected with a can opener. Each one contained several cells in a tin case with the connections made within. This form of cell has the peculiarity that a defect in any one of the cells renders the whole battery useless and thus makes business good for the battery maker. The case, being constructed of tin, makes the chance of an internal short circuit very

strong and then we have to have a new battery, which is profitable to the trade.

LOOSE GASOLINE TANK.

Finding that both batteries were useless we tried to remove them, but found that they were wedged so tightly between the gasoline tank and the back of the body that it was almost impossible to stir them. Nevertheless, they were removed by brute force, when the startling discovery was made that the batteries were depended upon to hold the gasoline tank in place. There were some iron straps which prevented it from moving forward, but nothing but the batteries to keep it from shifting backward. Had it not been for these poor, jammed batteries I might have had to chronicle the hitherto unrecorded accident of a gasoline tank lost on the road!

Doubtless the pressure of the heavy tank upon the batteries had produced internal short circuits. The gasoline tank was supplied with iron straps, firmly securing it in position, and two modern trays were made to hold ten cells each of the ordinary dry battery—five cells in each tray being arranged to spark one cylinder and five the other.

THE SPROCKET RATIO.

After this work was done the engine appeared to run very regularly and to develop nearly as much power as a motor of its size could be expected to produce with low compression. Still, the vehicle would not operate properly on the high speed, and the factory expert reported to me with frankness that the sprocket ratio was too high—a fact which I had already divined. I suspect that the expert was too candid with me to suit his employers, as a very few days afterward I learned that he had "got through." He should have remembered with Pudd'nhead Wilson, that: "Truth is a valuable thing; let us be sparing of it."

The expert's advice to change the driven sprocket for one of larger diameter was followed and the ratio of the driving sprocket to the driven was changed from 1 to 2 2-3 to 1 to 3. After this alteration things seemed considerably improved. The carriage would take slight grades on the high speed under favorable conditions and I began to hope to do some running.

(To be continued.)

The "Knoxmobile" Class B.

The Knox Automobile Company, of Springfield, Mass., originally built three wheeled gasoline carriages exclusively. At the Madison Square Garden automobile show in 1900 one of those machines was shown for the first time. In 1901 the company placed its four wheeler on the market after exhibiting its first models at the show in the fall of that year. The manufacture of the three wheeled runabout was discontinued shortly after.

The accompanying line cuts illustrate the four wheeled carriage, which, like it totype, has an air cooled, single cy engine. To increase the draught a fa added which called for a shaft to di Naturally this shaft was employed erate the exhaust valve and the c cam. These improvements change appearance of the motor to an exter may in themselves have induced the ers to make alterations in the "lay o the machine. With side springs to su the frame, machinery and body, it is able to have the centre of gravity ap mately half way between the axles. requirement was given due conside when the Knoxmobile was planned, ing by its appearance and its riding ties. The rear part of the springs stiffer than the forward part, and fo reason there is no "dipping" in front driving on rough roads.

DESCRIPTION AND SPECIFICATION

The wheel base is 5 feet 9 inches a gauge is standard. The road whee of the suspension type and have ra inch steel spokes instead of the conv al tangent spokes used in connectic most wire wheels. The tires are inch Dunlop clincher pneumatics. make was adopted but a compar short time ago. Formerly the whee equipped with single tube tires. Th axle is a special bronze casting. knuckles of the Panhard pattern, a truss and is of channel shaped cross s

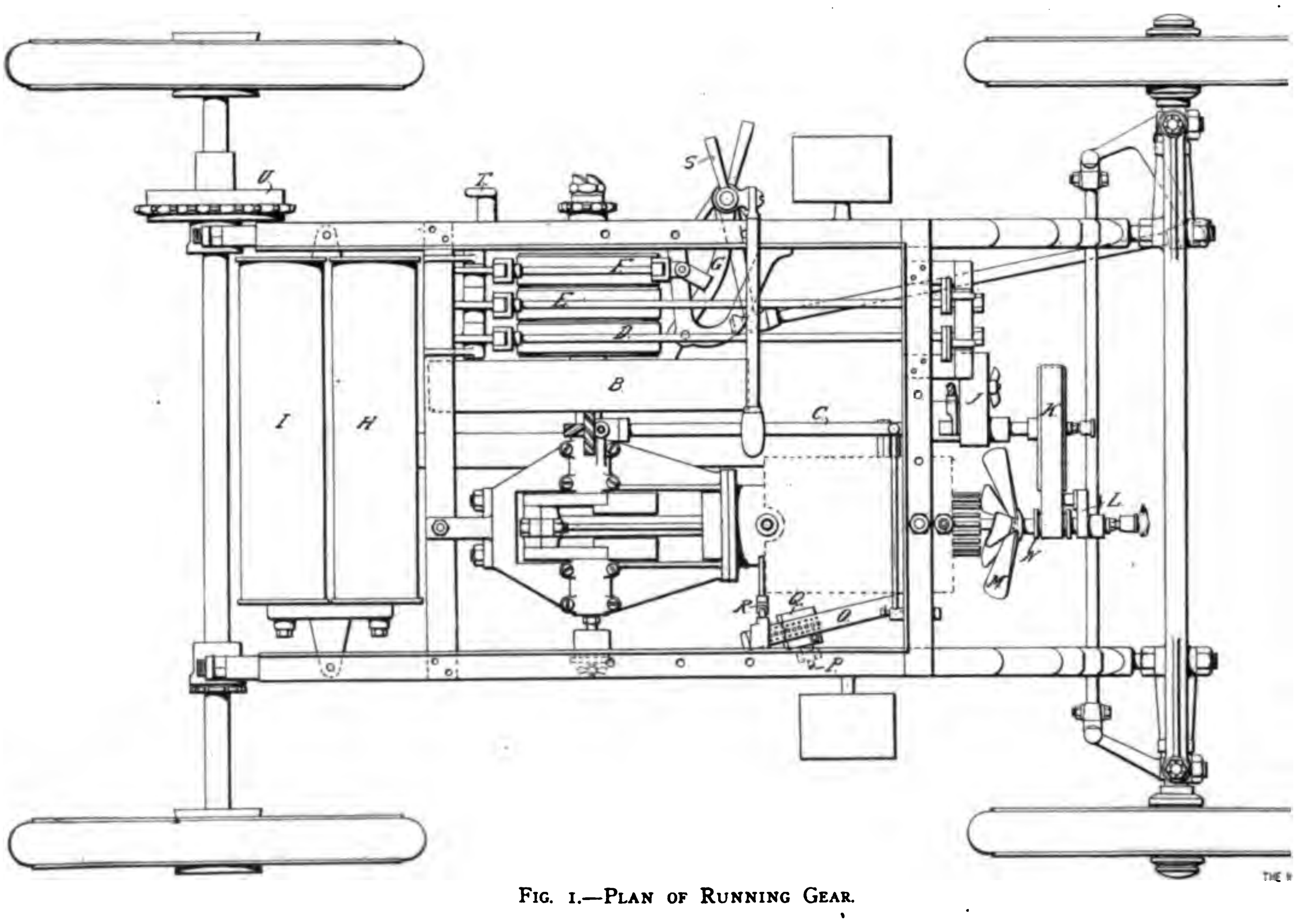


FIG. 1.—PLAN OF RUNNING GEAR.

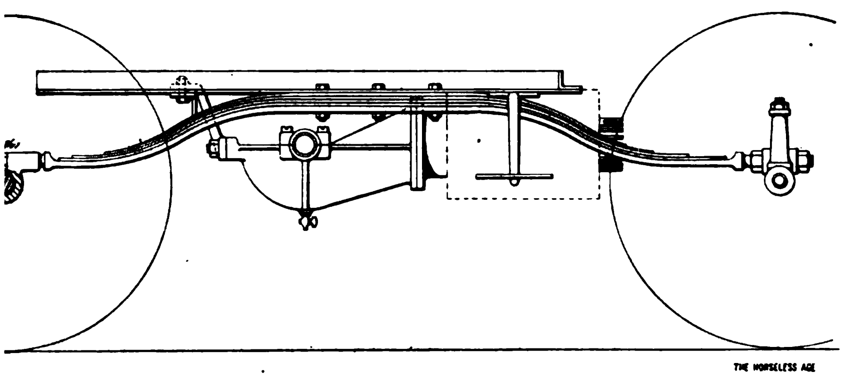
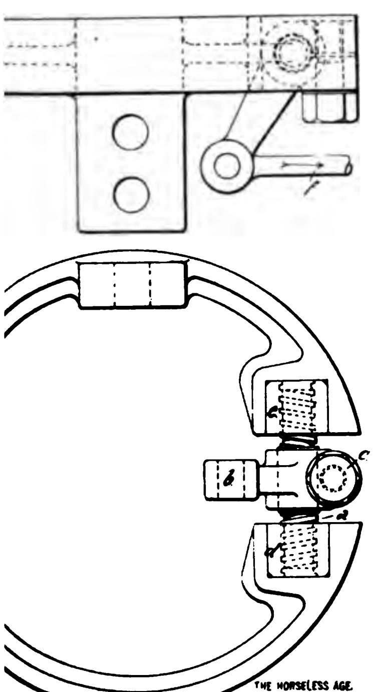


FIG. 2. SIDE ELEVATION OF RUNNING GEAR.

r axle is a solid nickel steel bore of ies diameter. It revolves in ball ;, the casings of which also serve pose of spring rests. The equaliz- r is located in the hub of the left ieel and is of the bevel gear type. sake of symmetry the hub of the 'iver is of the same outside diame- is hollow inside. What appears to differential drum (U) is the casting ı the large sprocket is secured. It is inside and contains the expanding the emergency brake.

engine has a bore of 5 inches, a of 7 inches and a flywheel of 130 weight. The bearings are of gen- proportions and have adjustable The frame is not a crank case, be- is open. To prevent the shaft and ing rod from splashing oil, a sheet ield is placed over the frame. This loes not inclose the crank, but is ı the sides. The cylinder head and inder are cast integral. To carry heat and cool the cylinder walls re 1,500 to 2,000 3-16x2 inch steel rewed into the cylinder and its



EXPANDING RING OF EMERGENCY BRAKE.

head. Throughout their entire length these pins are grooved.

The main clutch is of the expanding ring type, shown in the form of a brake in Fig. 3. It has a diameter of 10 inches and a face 2 inches in width. The arm (G) controls it. D is the drum of the foot brake, E the reverse and F the low speed. When running on the high speed only the main clutch is engaged and the drive is direct. The small sprocket has eleven teeth and the large one thirty-six. The mufflers (H and I), located at the extreme rear, are approximately 25 inches long and 6 inches in diameter. An exhaust pipe of about 2 inches diameter forms the passage of the spent gases from the motor to the mufflers. T is the case which contains the contact breaker. To advance the spark the case is raised. A large pulley is keyed to the cam shaft (C) and drives the fan (M) by means of a belt (K), a small pulley (N) and an idler, which is secured to a bracket (L). Air is admitted to the admission pipe (O), which has a large number of 3-16 inch holes. To keep back foreign matter these holes are screened. The fuel enters the vaporizer (Q) at P. The flow to the latter is float controlled. When starting up the bypass valve (R) is opened and gasoline flows into the pipe (O) directly. There is a butterfly valve in the pipe (O) which acts as a throttle and is set by an arm, which is connected up to the contact breaker's case.

When the spark is advanced the butterfly valve is opened, and when the spark is retarded the throttle is closed partially. The control arm that times the spark is brazed to a shaft located inside of the hollow steering column. In Fig. 1 this arm has been marked S.

The frame is built up out of 2½x2½ inch angle steel shapes with two cross-pieces. The springs are 2½ inches wide and have five leaves. The main leaf is about ½ inch thick and is made out of Swedish iron, which is not likely to break under any circumstances. All the other leaves are of spring steel. To increase the flexibility of the running gear the springs are fulcrumed at both ends. In Fig. 2 the method employed is shown in a manner self explanatory.

The lever T in Fig. 1 applies the emergency brake, which is double acting, as a glance at Fig. 3 will show. To a spindle *a* an arm *b* is secured by means of a cap screw *c* which clamps the jaws of the split hub so that the latter binds the spindle. The ends of the latter are threaded right and left handed so that the tapped blocks are forced apart when the brake is applied—i. e., when the link *f* is moved in the direction of the arrow. When the brake is relieved the ring springs back into its original position. No quadrant or sector is required to hold the lever T when it is thrown forward and the brake is applied, because the latter is locked at all times. It was stated above that the same principle is involved in the design of the flywheel clutch.

The gasoline tank, which holds almost 10 gallons, is located in the body under the right hand seat. Dry batteries and the tool chest occupy the space in the body under the operator's seat.

Cotter pins are used wherever possible and many of the nuts are of the castellated variety. All the wiring is of a high grade and is soldered to substantial terminals at both ends. Split hubs with clamping bolts constitute another good feature.

The carriage weighs 1,350 pounds with supplies and can carry four passengers when the boot is open. There is no mechanism in the body, so that luggage may conveniently be carried in the rear.

The Narragansett Races.

Several world's records were broken at the Narragansett Park races of the Rhode Island Automobile Club, of Providence, last Wednesday in spite of the heavy mud and the threatening clouds.

George C. Cannon, the young Harvard student, whose freak machine, built specially for track record breaking, has been victorious on several tracks, set a new world's record for one mile at 1:05¼, cutting over two seconds off the previous record made by himself. He also made the 5 miles in 6:05 flat, another world's record, the best previous record, his own, being 6:43 1-5.

Alexander Winton's "Bullet" sped around the track a number of times, covering one of the miles in 1:05 3-5. The sweepstakes prize was again carried off by Percy Owen, last year's winner, on a Winton, with the Toledo second.

F. Tudor, Jr., of Boston, won the special race for Winton touring cars.

The race for carriages under 300 pounds was won by the new Stevens-Duryea, which defeated the Knox, third, and the Oldsmobile, second.

In the steam class the Toledo was the winner, with the Locomobile second and the Stanley third.

In the electric class Knight Neftel captured the honors with his special car, with the Waverley second.

The motor cycle races were won by the Indian and the Soucin. In spite of the unfavorable weather the attendance was good.

...COMMUNICATIONS...

The Best Yet.

Editor HORSELESS AGE:

The article of E. F. White in last week's HORSELESS AGE is the best one yet, and I would just like to know what kind of whiskey Mr. White handles. He must have sampled an extraordinarily low grade just before writing that article.

It is too bad that we are not permitted to know the maker of a machine that is capable of running 14,000 miles with "little or no trouble."

CHAS. I. SHAWVER.

Fuel Economy Query.

Editor HORSELESS AGE:

Will you kindly advise me through your valuable paper if a steam truck equipped with a 10 horse power boiler and engine, total weight, 5,500 pounds—including all appliances, load and men—running at 6 miles per hour on good asphalt streets, should consume two-thirds of a gallon of gasoline per mile? It seems to me that this is a very high fuel consumption.

W. H. R.

[Your truck, according to the figures you give, has a fuel economy of 4⅛ ton miles per gallon. In the 100 mile endurance contest of the A. C. A. last spring the fuel economy of the steam carriages (the Whites excepted) varied between 4.98 and 8.10 ton miles per gallon, and the average was 6.67 ton miles per gallon. This contest was chiefly over good country roads, more or less hilly.—ED.]

Is a Firm Believer in the Automobile.

Editor HORSELESS AGE:

"The Item of Cost" article by Dr. Longaker, in your issue of September 19, tends to stagger prospective buyers like myself. However, there is one item not mentioned in his article which should be deducted from the total—what it would have cost him for horses and carriages to do the same work, barn, first cost, interest on the investment, paint and varnish, feed and depreciation in value, etc. Let us have both sides. I am a firm believer in the automobile and expect to own one next season. I also believe, if the auto receives half the care a horse gets and is driven as carefully as a horse is driven, it will do better work, last as long and be as cheap in the end. It is hard for an intending purchaser to decide what make to buy, for in every article I have ever read the name of a defective machine is carefully withheld, and others like myself fall into the error of buying that very make. This very fact prevents many from investing in an automobile.

As you suggested recently, why not have an endurance run in midwinter and another in March? Make the run, say, 50 miles, but do not postpone on account of bad roads or unfavorable weather. I do not blame the private owners for not wanting to face bad roads and weather, but let it be done by the manufacturers and let us see how much in earnest they are when they advertise "four season" machines. I, for one, will never buy a motor vehicle from any maker unless he shows his good faith by presenting very satisfactory evidence that his machines will do all he claims for them. I think they all charge good round prices for their several makes and the buyer expects full value for his money. These are my sentiments on the subject. F. W. SCHOOP, M. D.

[The coming endurance or reliability contest ought to furnish you the information you are after. The performances of all the competing machines will be fully reported and a trial of 460 miles in six days is certainly a pretty severe one. The several 100 mile trials already held this year have done much to demonstrate the qualities of the different vehicles.—ED.]

The Motor Bicycle Contest.

Editor HORSELESS AGE:

In reply to Mr. Bramwell's criticisms in your issue of September 10 I shall first acknowledge that I made an error when I accused him of saying that the belt would have to go and the chain be substituted. He said that the belt would have to go, and as he seemed so firmly convinced that the chain driven motor cycle is the only correctly propelled cycle so far brought out, I merely drew conclusions that he meant the chain was to be substituted therefor. But in his last letter he says the belt will have to go and so probably will the chain. Perhaps he is right, but in my opinion the belt will be the last to go. I further admit that as far as automobiles go the belt is a thing of the past. However, in the automobile line direct transmission by bevel or spur gears seems to be coming to the front, and perhaps they will take the place of chains. But this is not "motor cycle talk."

That a larger percentage of chain driven motor bicycles than belt driven machines won in the motor bicycle contest does not prove the belt driven machine inferior to the chain driven wheel. The riders of all the chain driven wheels were expert riders and the difficulties inherent to chain driven wheels were overcome on the road. A novice would have fared differently. An endurance run for amateurs (strictly) should be held with both belt and chain driven wheels, and then the outcome would be a fair proof of the relative efficiency of the two methods of driving. In regard to my statement in my previous letter about my belt breaking, that is also a thing of the past in the belt drive line: I use the belt exclusively, a broad, flat, three plait rawhide belt, 1 inch wide and 3-16 inch in diameter, copper wire stitched; this belt does not stretch or break, and the slip, if any, is so slight as not to be noticeable.

Referring to ignition devices, Mr. Bramwell says: "Has Dr. Clark read the articles on page 163, issue of August 13, entitled 'Motor Bicycles,' by Mervin O'Gorman?" I certainly did, and I failed to see where Mr. O'Gorman mentioned anything about the electrical devices being too small or in any way inferior or out of proportion to the rest of the machine. He merely said that the wires were too much exposed and perhaps too small size and he merely wired it over again, placing the wires where they were more protected from the elements. There was not a bicycle entered in that endurance contest on which the wiring was not properly insulated, unless it had been rearranged by the rider after it had left the hands of the maker.

Mr. Bramwell expects to see the hammer break ignition predominating on machines of 1903 and 1904. In 1903 and 1904 that method of ignition will be as antique as the belt drive on automobiles is now. Now, Mr. Bramwell's idea of the ignition of gasoline vapor is entirely correct. The spark necessary to properly ignite the gasoline vapor in the present automobile and motor cycle should be a hot, fat spark, such as is not produced by the jump spark method of ignition; but if he will consider this one point I am sure he will agree with me that such a spark is not wanted. Such a spark would ignite any quality of gasoline vapor mixture whether too rich or deficient in gasoline; consequently a novice would perhaps be running his machine on too rich a mixture and not be getting the power that the manufacturer claimed his machine to have. And, again, he might be using too little gasoline and the same result would occur.

My belief is that with the jump spark a mixture of gasoline and air of nearly the proper proportions will necessarily have to be used to be ignited, and more power and speed will be the result, and less condemnation of motor vehicles will be heard.

Further, on single cylinder engines of any power, using the jump spark method of ignition, three cells—or at most four cells—with a good coil will give a spark 1-16th inch in length at the spark plug terminals, and this will ignite even too rich a mixture. The batteries will last 500, or in some instances 1,000, miles without renewal. With the hammer break ignition six cells or more are necessary

In regard to what I said in my other letter about a certain motor being pretty cleverly incorporated into the frame, Mr. Bramwell disagrees with me, saying it shows misapplied ingenuity. And he further says that the motor should not be rigidly incorporated into or attached to the

frame, unless the frame is flexibly supported. This clearly shows that he is thinking of the automobile and writing about motor bicycles. His theory is practical if applied to the three or four wheeler bearing on the road surface at three or four different places; but where there are only two wheels and they both follow practically the same track the side strain is very slight, and the fore and aft strain is relieved by the forks having some elasticity, the spring seat post relieving to some extent the strain caused by the weight of the rider, and good sized pneumatic tires to a great extent the strains caused by having a motor attached to the frame in any manner. A motor just bolted to a frame does not show any ingenuity whatever, and no motor bolted to a bicycle can be applied so there will be no loss of motion; and a loose motor on a bicycle would soon mean destruction to the frame. I am confident that a spring fork properly constructed would be hignly appreciated by motor cycle riders and think it would be a great relief to the frame as well as to the rider.

In speaking of motors Mr. Bramwell says that an approximately correct mixture is more easily maintained in a large motor than in a small one. I do not agree with him one bit on this point, as the mixture is formed by passing air through or over gasoline and the motor has nothing to do with the mixing except to cause suction drawing in the air through or over the gasoline, and will draw in its charge, whether it be greater or less, according to the diameter and stroke. Again he says a good compression is easier maintained in a large than in a small motor. I do not see why (if the machine work is equal) that should be the case. In a small motor the compression may be reduced when the motor is heated too much. In the larger slow speed motor the same condition exists, but, perhaps, not to quite such an extent.

In his third statement Mr. Bramwell says the tendency of pistons to throw oil is less in large motors. It should be the same, or the construction is not good. He further says the heat of the plug is less in larger motors. I suppose he is comparing air cooled with water cooled motors, but he does not say so. But if both motors are air cooled the larger motor gets the hotter under otherwise equal conditions, as the thicker and larger area of metal holds the heat longer, and such a motor cannot maintain the same speed as small motors without sticking. He says the distance between piston and plug being greater in large motors than in small ones, the oil has farther to go to reach the plug in harmful quantity. Now, it is not necessary to use oil in such quantities as to ever reach the sparking plug in any quantity. A proper sight feed oiler will deliver just enough oil, and too much oil is as bad as none, not solely on account of plug, for a motor will not run as well with lubricating oil mixed with gasoline to make an explosive mixture. So we want only just enough oil in the crank cases to merely lubricate the bearings and slightly smear over the bore of the cylinder, and that is done by the lower portion of piston, below the rings, which does not fit as close as the rings, and a very little oil is preferable to a little too much every time. I have not seen one bit of carbon on a spark plug in my motor cycles in a year, have never heated a motor above normal in that time, and the bearings are not worn perceptibly. I use oil enough, but not too much. I have seen the folly of too much oil. I have found that an occasional squirt of kerosene into a gasoline cylinder, maybe once a day on the road, will increase the power of the motor 20 per cent.; it removes any residue of burned lubricating oil and cleans the ring grooves in the piston, while gasoline used the same way would interfere with lubrication.

EDWARD P. CLARK, M. D.

In Re the Standard "Warranty."

Editor HORSELESS AGE:

In the August 27 number of THE HORSELESS AGE was published the "standard warranty" of the National Association of Automobile Manufacturers. It may be regarded as surprising that this "warranty" has not been the subject of comment ere this, as it is rather a remarkable document.

The first paragraph reads: "We warrant all goods furnished by us for *sixty days* following the date of their shipment, based upon the date of invoice covering the goods, this warranty being limited to the replacement *in our factory* of all parts giving out under normal service in consequence of defect of material or of workmanship." The italics are mine.

This is the shortest period of guaranty of an expensive piece of machinery that the writer has yet seen, especially as the time required for the receipt of the vehicle from many of the remoter factories might easily amount to one-half of the sixty days.

By that time the "sight draft attached to bill of lading" would have been safely wafted through the bank.

The phrase "in our factory" is of interest. How convenient and cheap a procedure it would be for the anxious automobilist to ship his machine back from New York to somewhere in the Middle West, for instance, when something has broken a few days after the receipt of the vehicle! However, the effect of this phrase is somewhat alleviated in the next paragraph which states "If the circumstances do not permit that the work shall be executed in our factory, this guarantee is limited to the shipment, without charge, of the parts intended to replace those *acknowledged* to be defective." Again I have italicized.

But when one comes to paragraph four, one begins to see "where the laugh comes in." It reads: "We cannot accept any responsibility in connection with any of our motor cars when they have been altered or *repaired outside the factory*." (My italics.) If this means what it says, the owner who replaces a blown packing or a stripped stud "outside the factory" forfeits his valuable "guaranty"; the manufacturer is then free from care and the owner may whistle. But it hardly seems possible that this statement is to be literally interpreted. As far as the term "altered" is concerned, the manufacturer is undoubtedly in the right, as he should not, in justice, be made responsible for the failure of a machine which has had some other man's ideas crudely grafted upon it. But "repaired"! —this is too much, and it is hardly to be believed that the manufacturers would care to shield themselves under the letter of the law, for no owner can be expected to send his machine to the factory whenever *repairs* are needed. If, however, the wording is to be taken seriously, the "guaranty" would hardly hold more than two or three days after the machine is received, judging from common knowledge of the usual history of automobiles.

There is one paragraph which must meet with the assent of all: "It is, however, understood that we make no warranty whatever regarding pneumatic tires or the batteries." These fickle accessories are not the product of the automobile manufacturers, and there is no reason in the world why they should guarantee them. To do so would, in the experience of the writer, be a short cut to bankruptcy, and no special means to this end are apparently necessary.

Now there is not a word in this "warranty" in regard to goods being as represented in the manufacturers' catalogue, and one is expressly warned against the wily agent that the manufacturer has himself appointed in the following paragraph: "We are not responsible to the purchaser of our goods for any undertakings or warranties made by our agents beyond those expressed above." The "warranty" does not even guarantee that the motor car will "mote" or that it shall be in running condition when shipped.

Now there are manufacturers of automobiles who are genuinely interested in the satisfaction of their customers, which is synonymous with being concerned with their own success as producers of self propelled vehicles. They are ready and willing to see their customers through and to go more than half way in their dealings with them.

These manufacturers will hardly be expected to shield themselves behind a warranty which is practically a disclaimer of liability, but this may not be true of the manufacturers of another stamp, if such there be.

A warranty, according to the dictionary, is an agreement that warrants, and not a form of words that reads more like a loophole of escape.

USER.

Various Definitions of Percentage of Grade.

Editor HORSELESS AGE:

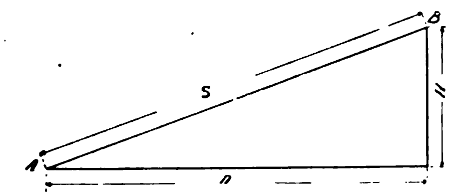
In your issue of September 17 are some very interesting tables and diagrams by Reynold Janney regarding the horse power required at different speeds for overcoming air, traction and grade resistances of automobiles.

Examining the formula for grade resistance, with my ordinary engineering definition of grade, I found it to yield very absurd results in extreme cases.

For instance, to carry a weight of 1 ton up a 1,000 per cent. grade (10 feet vertical to 1 foot horizontal) at a speed of 1 mile per hour the horse power required would be as per formula $\frac{1 \times 1 \times 1000}{18.75} = 53.3$. For a 10,000 per cent. grade (100 feet rise to 1 foot horizontal) it would be ten times as much, or 533 horse power. As the lift is nearly vertical in both cases it is evident that there would be little difference in the horse power required (the correct result being 5⅓ horse power for both cases.)

Following it up I found that Mr. Janney has adopted a different definition of grade from that in general use and that his formula is right for his definition of grade.

In the diagram below, if we conceive a railroad track running from station A up the mountain side to station B, the railroad engineer would divide H by D to



find the per cent. grade. Mr. Janney divides H by S to find the per cent. grade. This makes all the difference in the world in extreme cases. A hundred per cent. grade means 45 degrees slope to an engineer; it means a plumb line in Mr. Janney's usage. His definition is very convenient for the purpose of his formula, but attention should be called to the fact that it is not the ordinary definition. I was entertaining myself by deriving from his formulæ a formula for the maximum speed at which a car would descend a given grade if turned loose:

$$V = \sqrt{\frac{200\,W}{A}(20\,G - T)}$$

With the ordinary definition of grade this would be absurd, as it would give no limit to the speed. With Mr Janney's definition 100 per cent. is the maximum grade and the formula is rational.

M. J. PATTERSON.

The Repair Shark Problem.

PATERSON, N. J., September 26.

Editor HORSELESS AGE:

In the last issue of THE HORSELESS AGE I noted a communication signed "Viator," in which the writer makes several comments on my article dealing with experiences with road sharks in the guise of auto repair men. His first suggestion about the manner in which I should have dealt with the New York agent who raised the price of the repair work is, perhaps, a good one, but as I stated, I had no desire for long legal controversy and, possibly, he is not aware of the fact that in order to secure my property it would have been necessary for me to give bonds in the sum of $100 or more, being a non-resident, in order to insure the payment of the costs of court in case of a decision adverse to me. Then probably it would have taken a week or more to go through the necessary red tape of law process, and the use of my machine for that time was worth more to me than satisfaction. This is to say nothing of the cost of counsel fees.

He also speaks of the water incident at New Brunswick and states that in such instances the charge is not for the water, but for the service and time of putting it into the tanks. I have had automobile experience enough to appreciate the value of a tip and I doubt if there are many owners who have had larger expenses in that line than myself, but I wish to assure the gentleman that the charge at New Brunswick was for the water and not for putting it in the tank or getting it, as the man in charge distinctly stated that the water was his and he would sell it if it suited him to.

"Viator" is evidently a man of some strenuosity judging from his advice as to the manner of dealing with repair station men. He seems from his article to be of a class akin to the preacher who liked his toddy as well as the next, and when censuring a drunken member of his congregation remarked: "Do as I say, Thomas, not as I do."

When it comes to a question of making a number of trips to and from the seashore, to testify before grand juries, if criminal process is invoked, or to attend trials for civil damages at times most inconvenient, or that of being delinquent to the other fellow who owns a machine and might also be wrongly dealt with at some time. I am willing to be declared delinquent in my duty to fellow sportsmen, and let it go at that. Unfortunately, perhaps, I have not as yet become imbued with any of the martyr spirit.

In my opinion the poor fellow who rented my machine out had a worse fright from its supposed theft than a dozen suits could have given him, and I do not believe he will be likely to take any such chances in the future.

I have written my experiences so that others may benefit by them, and I regret that I should have expressed myself in so indefinite a manner as to call forth the criticisms they seem to have evoked.

HARRY B. HAINES.

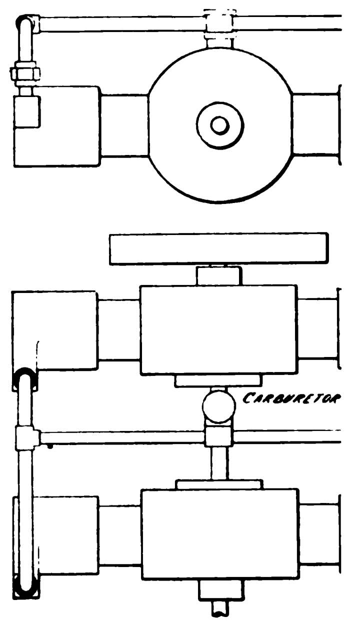
A. C. A. Reliability Run, October 15.

Explosive Engine Quer

Editor HORSELESS AGE:

I have two horizontal, double cylinder motors, with shafts c per sketch, operating a heavy a The cylinders are 5 inches in di 5 inches stroke, with a maximum 800 turns per minute. The ope the inlet pipes are indicated on t

I will be pleased if you will plan for inlet piping and arran



carburetor or carburetors to su cylinders.

I would also be pleased if y suggest some particular make o carburetor for this service. Al state the minimum weight of fly inches outside diameter, which w satisfactory results with this mo

C. E. I

[We would suggest to screw ples into the intake openings an nect the two nipples on the san the crank by a bent brass tube connected to the nipples by uni two bent brass tubes are conne brass tube running parallel wit gines, the joints being made by and brazed. The carburetor is at the middle of the last menti and can be braced from one of cases or from both.

Any of the carburetors advertis columns will, we believe, serve pose.

For the flywheel we would re 100 pounds of weight in the rim ing that the two engines are so that there is one explosion each olution.—ED.]

Editor HORSELESS AGE:

Will you kindly note the di given below and answer through uable paper the following questio

What would be the compressi

atmosphere? Will the valves admit the full charge, which is 169 cubic inches, at the rate of 480 revolutions per minute? What will be the horse power at 480 revolutions? The engine is to be vertical, of the four cycle type, with four cylinders, 6 inch bore and 6 inch stroke, compression space 40 cubic inches. All valves are to be mechanically operated and to be 2.2 inches diameter in the open, or underneath the valve. The valve stem will be 8-10 of an inch in diameter and the lift of these valves 9-20 of an inch.

G. J. HELLER.

[The compression, if there is no leakage, would be about 105 pounds per square inch above atmosphere, which is considerably higher than the usual compression.

The power may be 24 horse power.

The valves are large enough in diameter, but the valve stem is heavier than required; 5/8 of an inch diameter would be amply sufficient.—ED.]

A Private Six Day Run.

PATERSON, N. J.

Editor HORSELESS AGE:

What is perhaps the longest straightaway run ever attempted in a light gasoline automobile of the runabout type has just been completed by James C. Gould, a local coal dealer, and Arthur W. Stockbridge, also of this city, in a 4 horse power machine of standard make.

The two left Paterson early on the morning of September 13 and that night reached Stamford, Conn., without a stop. The next night saw them at Palmer, Mass., and the third was spent at Worcester, Mass. On the afternoon of the fourth day Boston was reached. Some time was spent there and the trip back to Paterson was made in good time, the two reaching this city early Saturday morning, September 20, their odometer registering 1,020 miles.

The machine was towed home the last 15 miles, a worm gear having been so worn from lack of oil that it would not perform its functions and no duplicate part being obtainable. The only other mishaps during the entire trip was the burning out of two gaskets in the cylinder head. Both of these were replaced on the road, one of them during a rain storm and under the shelter of a mackintosh.

The average speed during the entire running time was 15 miles an hour, and sometimes as high as 18 miles an hour was made.

HARRY B. HAINES.

Political campaigning by automobile is becoming quite common. Dr. J. A. Rene, West Superior, Wis., a Democratic nominee, is to follow the example of Mayor Tom L. Johnson and tour his district in a red automobile.

THE NORTHERN GASOLINE RUNABOUT.

The Northern "Runabout."

The accompanying half tone is an illustration of the "Northern" gasoline vehicle, which has recently been brought out by the Northern Manufacturing Company, of Detroit, Mich. The machine belongs to the single cylinder, explosive motor class of automobiles, with side spring suspension. The bore of the cylinder in 4¾ inches. The piston stroke is 6 inches and the normal speed is about 600 revolutions per minute. Two forward speeds and a reverse, with direct or "free" drive on the high gear, are employed, the planetary type of variable speed gear being used. The pinions of the change speed device are made of brass and have a width of face of 1¼ inches.

The wheel base is 10 feet 9 inches and the tread is standard. All the wheels are 28 inches in diameter and are fitted with Dunlop clincher tires of a cross sectional diameter of 2½ inches. The wheels are of wood and have fourteen spokes each, arrear wheels are keyed to their respective tillery hubs and run on ball bearings. The shafts, which revolve in ball bearings, the races of which are located in the tubular axle. A 3/8 inch truss supports the latter. The compensating gear is of the spur gear type and revolves in a box which has windows on the sides and openings for the chain. A double acting brake clamps the drum of the differential when the operator presses on the pedal. The admission and exhaust valve are both raised from their seats mechanically. A horizontal shaft which revolves at half the engine speed actuates the valve rockers by means of cams. The helical gears on the cam shaft and crank shaft are enclosed in a dustproof case and run in oil. The carburetor is of the float feed type. It is provided with a gate to throttle the admission of air, and there is another gate between the carburetor and the inlet port. To lift the exhaust valve a tapered rod is inserted between the two little rockers that raise that valve. When the operator ceases to press on the pedal that shifts this rod a coiled spring induces it to relieve the valve. The circulating pump is driven off the cam shaft and forces the water through the radiator, which is located under the boot, below the level of the footboard. Ignition is by jump spark. Two sets of dry batteries of five cells each furnish the current and a Splitdorf coil is used. The control devices are a tiller, speed gear, control lever, accellerator, brake pedal and a pedal to relieve the compression when starting up. The latter may be employed when coasting down long hills with the power off. The fuel tank of this car holds approximately 8 gallons.

The Noble Gasoline Vehicles.

Another new automobile concern has recently been organized to build machines at No. 1174 Hamilton street, Cleveland, under the name of the Noble Automobile Manufacturing Company.

They build three different models—a light runabout with 6 horse power engine, a two seated rig with a 7 horse power engine, and a touring car with a 10 horse power engine. They will also build a light delivery wagon. The machines are equipped with a very simple and effective transmission gear of original design, giving two speeds forward and one reverse.

The mixer is also of original design, giving perfect mixture under varying conditions of speed and load. To vary the speed of the engine, the air and gasoline are cut off in equal proportions. By using this throttling system great variation of engine speed may be obtained. At the same time the combustion is perfect and the machine leaves no odor in its wake. The machine has the appearance of extreme simplicity and effectiveness. The company is incorporated with J. C. Meader, president; J. C. Noble, vice president and general manager, and A. F. Monroe, secretary and treasurer.

...OUR... FOREIGN EXCHANGES

The British Reliability Trials—Causes of Loss of Marks.

No. 5. 5 horse power Peugeot.—Lost one mark on Monday through the driver accidentally stopping the engine.

No. 4, 5 horse power Century Tandem.—Six marks on the first day for changing an accumulator and four on the third day for stopping to clean and adjust contacts.

No. 10, 5½ horse power Locomobile.—Lost forty-eight marks for a chain coming off once, the other deductions being for stops for water.

No. 20, 5½ horse power Locomobile.—Besides the usual deductions for water stops, had a heavy loss of marks one day owing to the driver's coat catching in the throttle, so that he could not shut off steam, and he charged a wall.

No. 9, 5½ horse power Locomobile.—Lost marks for time in taking on water and a stop for chain adjustment.

No. 47, 8 horse power De Dion.—Lost one mark for repairing a broken terminal of the high tension ignition circuit.

No. 88, 15 horse power Panhard.—Lost one mark on Wednesday for changing accumulators.

No. 74, 15 horse power Germain.—Lost three marks on the second day owing to a faulty sparking plug.

No. 82, 20 horse power Maudsley.—Lost three marks owing to the gears springing out on the hills, thus causing momentary stops. The change speed lever was too light and got slightly sprung.

No. 41, 10 horse power Wolseley.—Lost five marks for a puncture in one of the rear tires on Tuesday.

No. 42, 12 horse power Belsize.—Lost five marks on the last day owing to the head breaking off on inlet valve.

No. 44, 9 horse power New Orleans.—Five marks were lost through a nut on the clutch pin working loose and one through the driver accidentally stopping the engine.

No. 66, 12 horse power Humber.—Lost six marks on account of the joints between the water tank and pipes working loose.

No. 64, 10 horse power Peugeot.—Two marks were lost for accidental stopping of the motor on Monday and Tuesday, and five for a puncture on Thursday.

No. 86, 22 horse power Daimler.—Lost eight points in all for a punctured tire on Friday and the breaking of a pipe on Saturday.

No. 71, 8 horse power Wilson & Pilcher.—Lost eight points by stopping to adjust a slipping clutch.

No. 59, 7 horse power Germain.—Lost nine marks in all, of which three are said to have been caused by the driver forgetting to turn on the gasoline.

No. 76, 12 horse power Daimler.—Lost three points on Monday owing to loss of pressure in the gasoline tank, four points on Wednesday to renew gasoline supply, and five points on Saturday for a tire puncture.

No. 33, 12 horse power Gladiator.—Lost eight points Friday owing to faulty spark plugs and dirty trembler, and three points on account of the engine stopping on a hill.

No. 40, 7½ horse power Wolseley.—Lost one mark on Tuesday for stopping the engine on a hill, eleven on Friday and three on Saturday for the same cause.

No. 21, 5½ horse power Locomobile.—Lost four marks on Monday, five on Tuesday, four on Wednesday, two on Friday, and one on Saturday for stops for taking on water.

No. 62, 6 horse power Gardner-Serpollet.—Lost twelve points through an admission valve sticking, five for a puncture, and three more marks not accounted for.

No. 84, 20 horse power Pascal.—Monday, stop for water, five; stop to put resin on clutch, one. Tuesday, adjustment of slipping clutch, twelve; refilling radiator, two.

No. 32, 9 horse power James & Browne.—On Tuesday four marks were lost through a faulty sparkling plug, and on Wednesday five, from the same cause. On Friday the governor clogged with dust from the clouds which were raised by the competing cars—stuck shut and stopped the engine, two. Adjusting brakes before climbing Westerham, two, and gear jumping out on Westerham, one. On Saturday the governor stuck open, so that the engine raced and broke the governor, ten marks being lost through delay in removing the parts of the governor.

No. 35, 10 horse power Brooke.—Lost eleven marks on the first day on account of a nut having worked off an inlet valve, the split pin having been left out. On Wednesday the lid was left off the coil case, and the rain got in and saturated the trembler and wires, and it took fourteen minutes to dry these out. One mark was lost on Thursday for refilling the gasoline tank, as enough was not put in at the start.

No. 30, the 10 horse power Decauville.—On the first day one of the driving tires suffered from leaky valve, gradually deflated, and about 20 miles from the Palace had to be pumped, for which five marks were deducted. On the second day three marks were lost through removing dirt from petrol pipe. The union had to be unscrewed and cleared, which took under three minutes. On the third day twenty marks were lost owing to the cooling water being evaporated and the engine running hot.

No. 23, 8 horse power M. M. C.—Lost nine marks for adjusting trembler on coil. The other deductions were for punctured tires.

No. 63, 6 horse power Gardner-Serpollet.—Lost twenty-five marks for tire troubles through faulty air tubes, six for cold generator (lighting up was left too a wait had to be made to heat t ator), and two for putting in wa

No. 57, 10 horse power M. M. eight marks through sideslip and lision, ten marks through running gasoline and stopping to refill, eig for a broken copper pipe, and the r count of the electric contact bre ing trouble and a broken inlet val

No. 24, 6 horse power De Di nearly all its trouble through the of a water pipe from the cylinde the tank on the first day.

No. 19, 7 horse power Star.—Lo seven marks through pump runnin that the engine gripped; twelve stopping caused by dirt in carbur for starting late in the morning, a being early at control.

No. 83, 20 horse power Pasc thirteen marks for refilling with on Monday. Later compression and a sparking plug changed. W also taken during the fifteen min ten more points being lost. Tue fective valve, three, inserting ne five, and taking water, two. W taking water and pumping up co in gasoline tank, thirty, and starting handle and pump, five. pressure feed, one. Friday, di Saturday, inlet valve replaced, ni

No. 48, 8 horse power Clém short of water at the foot of the on the first day, where the dri the error in judgment of tryin home without water. The resul overheated the engine, ruined th etc.

No. 87, 22 horse power Daim day, in dropping in the clutch at of Westerham, the commutat jumped off, and 137 minutes we endeavoring to find the correct for the pulleys, though eventuall was driven home on the tube igni the commutator put right afterw

No. 52, 10 horse power A stoppages were due to the carbu ting no gasoline from the tank cending hill. The car was stop behind another, the driver co there was not sufficient room to

No. 51, 12 horse power Gladiat 104 marks owing to the pin co of the two to one gear. On Tue marks were lost for faulty spark and on Thursday fifty-one marks, sparking plug and broken trembl

No. 39, 10 horse power. W Missed five marks on Friday thro lision with a horse. The car was by the roadside, but, of course, sulted in a heavy loss of marks than 144 being dropped. On Sa lost ten marks for punctures.

No. 36, 8 horse power Sim heavy loss of marks on the third caused by the failure of the cou the main propeller shaft. The rep these only took a few minutes, the

course, being lost in sending to London for the new couplings.

No. 81, 20 horse power M. M. C.—Lost its 295 marks as follows: The brake drum had water put in after it was heated, which caused a fracture, and entailed a loss of 275 marks before the journey could be resumed. The rest of the marks were lost through ignition plugs and tremblers on the coil giving trouble.

No. 54, 12 horse power Century.—Three hundred marks were lost on the third day owing to a key stripping in the bevel gear. The time occupied in taking the gear down and fitting the new key was five hours, or one whole day's marks. The other forty-five marks are accounted for as follows: A cotter on one of the inlet valves broke, the cause taking some time to discover—twenty-four. Twenty-one marks were lost before the trials commenced by the mistake of a fitter who had carelessly put on one of the brakes the wrong way.

No. 65, 12 horse power Brush.—The whole of the trouble was due to using defective coils, two of which had to be replaced, causing considerable delay on the road on three days, and resulting in no marks being earned at all on Friday.—*Condensed from the Autocar.*

Arnoux & Guerre's Magnetic Circuit Breaker.

Some time ago a query was sent in by a reader of THE HORSELESS AGE as to the practicability of using a buzzer or magnetic interrupter on a coil used in connection with a high speed motor. Assuming, for instance, that the motor runs at 1,500 revolutions per minute, the cam shaft on which the commutator is located makes 750 revolutions per minute, or 12½ per second. If the metal contact strip on the periphery of the commutator wheel occupies an angular space of 18 degrees, or 1-20th of a circumference, the hammer of the magnetic buzzer has just 1-250th of a second to vibrate in. It seems hardly possible that the hammer could make a complete back and forth swing in this exceedingly short interval of time, and certainly not more than one interruption of the circuit would be made by the buzzer, so that its employment would be of no benefit. We had at that time no data convenient regarding the rates of vibration actually attained with magnetic circuit breakers; but find in a recent issue of *La Locomotion* an article dealing with this subject and describing an improved buzzer claimed to have a much higher rate of vibration than those now commonly used.

According to the inventors of the new device, Messrs. Arnoux & Guerre, the periodicity or rate of vibration of the usual buzzers varies between 162 and 172 simple swings per second, or eighty-one to eighty-six interruptions, so that the time actually required to first establish and then break the circuit is 1-86th second at a minimum. Therefore the buzzer will produce one spark or none at all, according to whether the duration of contact at the commutator is greater or less than 1-86th second. It will be seen from this that at high speeds the period of contact at the commutator is too short to allow the buzzer to properly do its work, and the circuit interruption which determines the spark in the cylinder will be that at the commutator. However, since the break at the buzzer only is bridged by a condenser the spark thus produced will be weak and most likely ineffective.

Experience thus having shown that the impossibility of exceeding speeds of 1,000 revolutions per minute or so with engines ignited by a coil with buzzer was due to the slow period of vibration of the buzzer. Messrs. Arnoux & Guerre tried to devise a much more rapid one, seeking to secure this end by reducing the vibrating mass and increasing the force causing the vibration. And they claim to have succeeded, without changing in the least their regular coil, to adapt to it a buzzer which when operated from a 4 volt source of current gives 436 interruptions per second, or about five sparks in the same time that the ordinary buzzer gives one; so that with this trembler motor speed of 5,000 revolutions per minute would not be out of the question as far as ignition is concerned.

As shown in Fig. 1, the buzzer consists of a single strip A of highly magnetic steel, the width of iron core of the coil and from 8-1000ths to 12-1000ths of an inch thick. At one end this strip is clamped in a metallic block B and at the other it is provided with a contact point or rivet of platinum C.

When at rest this strip A presses against another strip D, which is very elastic, much shorter and also has a platinum contact point. The initial tension of the strip D holds the two points constantly in contact, whatever be the amplitude of swing of the main spring. The spring D is fastened by one of its ends, E, to a soft iron strip F. Its other end projects beyond the contact point so as to limit the swing of the spring by extending into a groove H on a post K. The soft iron strip F also plays an important part in the magnetic action of the iron core. It greatly intensifies the magnetic field between it and the end of the core in which the spring A swings, and thus increases the attractive force on the latter.

The modus operandi of the device is easily understood. As soon as the current flows through the primary coil and the contact CC', the springs A and D and the binding posts T and T', the core of the coil attracts the spring A, which is followed up by the spring D until the latter is stopped by the wall of the groove H. The attraction of the spring blade A is, moreover, reinforced by the magnetic action of the soft iron strip F, which is repellent, since the strip, under the inductive action of the core, acquires the same polarity as the spring blade.

The stopping of the contact spring D while at full speed of vibration insures a very abrupt interruption of the primary current, a condition essential to obtaining the highest possible voltage in the secondary winding, as is well known. In fact, although the quantity of electric energy appearing in the secondary circuit is appreciably the same whether the primary circuit be broken abruptly or gradually, the quotient of this energy by the time during which it is flowing—in other words, the mean electric power—is the greater the smaller the time it takes the primary current to die down. This is also the reason a condenser is connected across the interrupter. Experience has shown that with an ordinary trembler the spark potential drops to one-fifth its value when no condenser is used. But in spite

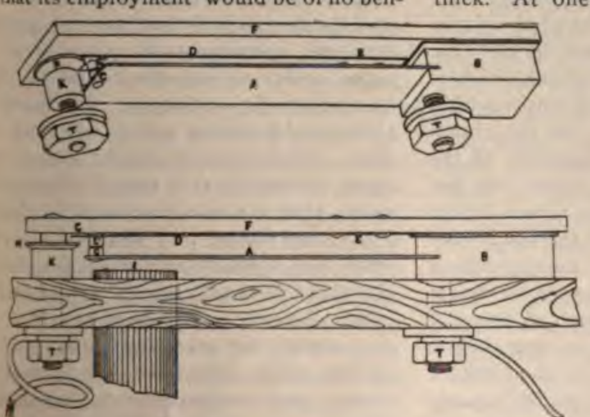


Fig. 1.

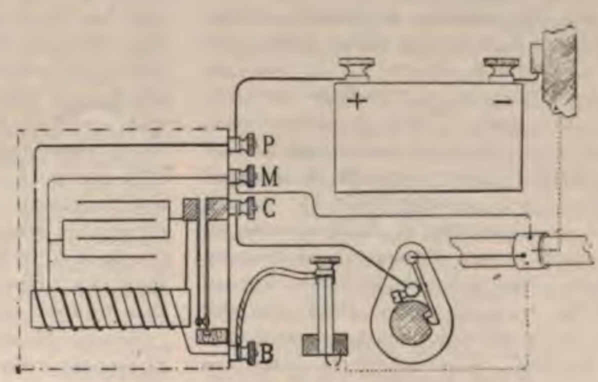


Fig. 2.

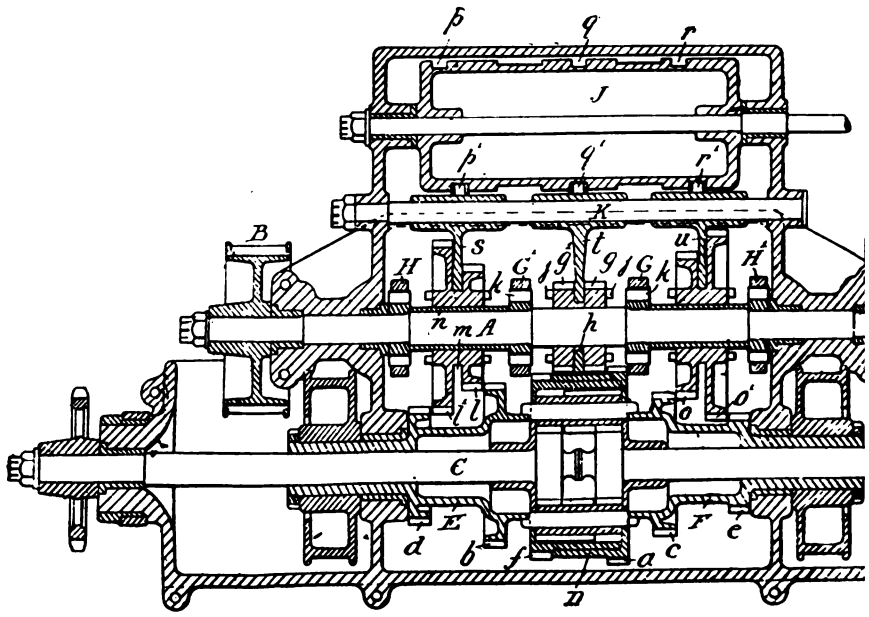
of this a very rapid mechanical interruption of the primary current still retains its advantages, and Lord Rayleigh has shown that if the break is produced very abruptly by means of a ball projected with a high velocity from a firearm, the use of a condenser becomes superfluous and even detrimental, and the same facts are confirmed by experiments with the Whenelt electrolytic interrupter. The very rapid circuit breaker of Messrs. Arnoux & Guerre also has the advantage of considerably increasing the time of contact between the two platinum points. The device will operate successfully with voltages varying from 2 to 12 volts, it is claimed. With 12 volts the spark plug points are spaced about 3-32d of an inch

Another improvement these manufacturers have introduced in their ignition outfit insures that always at least one spark is produced no matter how short the duration of contact in the primary circuit, even if this time is too short for the buzzer to operate. They attain this end very simply by interposing the commutator between the buzzer and one of the terminals of the condenser. The condenser is thus in reality connected across the two breaks in the primary circuit and it therefore performs its function of absorbing the extra current at whichever one of the two points the break occurs. As shown in Fig. 2 the coil is provided with a third binding post C, which is directly connected to the contact strip of the commutator, the same as in the case of coils without buzzer.

The Wolseley Speed Changing Gear.

We illustrate herewith the transmission gear of the Wolseley gasoline carriage. The Wolseley is one of a few distinct English types of cars and has been very successful in the last two reliability trials held in Great Britain, one of the two vehicles which came through the last trial with absolutely no penalized stops being of this make.

The Wolseley cars have a horizontal engine in front from which the power is transmitted to the variable gear of the shifting gear type by means of a Renold chain. Referring to the drawing, the shaft A carries the sliding wheels of the change speed and reversing gear, and is driven through the medium of pitched chains, and wheels B, from the motor shaft. The shaft C, which is driven by the shaft A, and constitutes an intermediate shaft between the shaft A and the driven road wheels, is divided into two lengths which are geared together through the medium of balance gear within a drum D. A gear crown *a* around the drum D constitutes the wheel for the slowest speed running forward. The wheel *b*, which is formed with the sleeve E and is rigid with the drum, is the wheel for the next speed running forward. The wheel *c*, which is formed with the sleeve F and is rigid with the drum, is the wheel for the next speed running forward. The wheel *d*, which is formed also with the sleeve E, is the wheel for the next speed running forward; and a gear crown *e*, formed around the sleeve F, constitutes the wheel for the next or fastest speed running forward. A gear crown *f* formed around the opposite



THE WOLSELEY SPEED CHANGING GEAR.

side of the drum D to that at which the gear crown *a* is formed, constitutes the wheel for the reverse running of the drum.

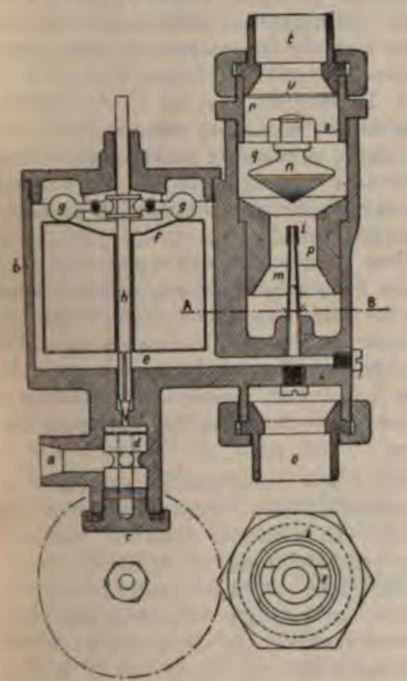
The spur wheels on the shaft A are formed in pairs, with a groove between each member of each pair, and these wheels are capable of turning freely upon the shaft A and of sliding endways along it.

The wheel *g* may be slid into gear with the wheel *a*, and when it is out of gear the wheel g^1 may be slid into gear with an idle wheel which is always in gear with the wheel *f*. Upon the shaft A are fixed clutches G G^1, the clutch G being to the right hand side of the wheel *g* and the clutch G^1 to the left hand side of the wheel g^1; and from the outer side of each of these wheels project teeth or studs *j*. When the pair of wheels $g\,a^1$ have been moved endways along the shaft sufficiently to bring the teeth of one of them about half way into gear with the teeth of the wheel *a*, or of the idle wheel, as the case may be, the teeth *j* of the wheel which is thus brought into gear will enter within holes, or between teeth *k*, of the clutch which is at the corresponding side of the wheel, and the teeth *j* will enter fully between these teeth *k*, as the wheel is slid fully into gear. So long as the teeth *j* are not engaged with the corresponding clutch, the wheels $g\,g^1$ can turn freely on the shaft A, and thus the teeth of either of them are about half way in gear before they become interlocked with the shaft A.

Wheels $l\,l^1$ are mounted to be capable of turning freely upon and sliding endways along the shaft A, or on and along a sleeve *n* fixed around the shaft as tance piece between the clutch G^1 clutch H. Wheels $o\,o^1$, which are f together and mounted upon the shaft in the case of the wheels $l\,l^1$, are c of being slid into gear, respectively the wheels *c e*. The sideway movem the sliding wheels is effected throug medium of a drum J, which has circ ential grooves *p q r* therein, with engage, respectively, rollers p^1 q^1 sliders *s t u*, which are capable of along a bar K, and which have which engage with the grooves, re ively, which are formed one betweer pair of wheels, the grooves aroun barrel forming paths which insure when the barrel is at its zero point, speeds are out of gear, that as it is through its full range, in a directi forward running, the lowest spee ward is first brought into gear, t moved out and the next higher brought in, and so on up to the h speed, the teeth of the sliding whe next higher speed being entered siderable distance between the teeth wheel they are intended to drive the sliding wheel of the lower spe comes disengaged from the corresp clutch. As the barrel turns back ag zero, the operations take place in t verse order; and as the barrel is from zero in a direction for ba running, the reverse speed is broug gear, and this speed moved out o again as the barrel is turned backw zero. If it is desired to enter the ing sliding wheel into gear with t wheel before the sliding wheel for th est speed forward has been slid gear with its corresponding whee vice versa, the reversing wheel a slowest speed gear wheel are form arately and mounted to be capa turning upon their shaft independe one another.

A Belgian Bicycle Motor Carburetor.

The cut herewith represents a carburetor of the constant level, spraying type manufactured by the Fabrique National d'Armes de Guerre d'Herstal. Mostly the carburetors used with small engines are constructed without a constant level compartment and float, as these are thought to be unnecessary refinements



A Belgian Motor Bicycle Carburetor.

and to entail too many complications. The design herewith shown is, however, quite simple.

The gasoline enters the float chamber through a union *a* and a cylindrical projection from the bottom of the float chamber *b*, which projection is drilled. On the way to the float chamber the gasoline is caused to pass through a wire gauze *d* and any dirt that may collect on this gauze can be removed by taking out the plug *c*. The float *f* acts on the needle valve *h* through the intermediary of the levers *g g*.

From the float chamber *e* the gasoline passes through a drill hole in the bridge *s*, which is closed by the fillister head screw *l*. The gasoline rises in the spraying tube *m*, which is in communication with the drill hole in the bridge *s*, to the same level as in the constant level compartment. The spraying tube is provided with a device which is designed to prevent an accidental rising of the fuel above the spraying tube and consequent flooding of the mixing chamber. This device is claimed not to interfere with the regulation of the carburetor; it consists of a ring *i*, surrounding the upper part of the spraying tube and extending above it. Its diameter is such that it does not interfere with the spreading of the jet from the sprayer.

When the piston of the motor sucks the gasoline is projected from the spraying tube *m* against the pulverizer *n*, the lower cone of which is grooved. This cone is riveted into a bridge *s* in a flanged nipple *r* screwed into the top of the vaporizing chamber, and to the top of which the intake pipe is fastened by means of a union. It will be observed that the path of the air through the carburetor is straight. The suction around the mouth of the spraying tube is increased by surrounding the tube by the metal insert *p* as shown.

Imprimus Electric Victoria.

A new electric vehicle, a victoria de luxe, has recently been introduced by the Imprimus Motor Car Company, of London. The vehicle is operated on the Scheele system and has seating accommodations for four persons inside, while the driver's seat will hold two, the carrying capacity of the carriage thus being six persons. The propelling mechanism consists of two series wound motors suspended by springs, provided with a radial movement, from the rear axle. They are entirely inclosed so that no dirt or wet can get inside, but the covers can readily be removed for the renewal of the brushes or examination of the commutators. They are designed to run at a normal speed of 600 to 700 revolutions per minute, but are capable of withstanding a considerable overload for short periods without suffering harm. The ends of the motor shafts are fitted with hard steel pinions which gear into machine cut spur wheels of phosphor bronze bolted on the rear wheels. Current is supplied from a battery of forty cells carried under the seats. The cells have a capacity of 160 ampere hours, and furnish sufficient energy to propel the carriage about 40 miles over average roads on a single charge. Charging takes about five hours, when the charging circuit is at 110 volts. The controller is placed beneath the driver's seat, and is substantially built, and most simple to operate and keep in order. As nearly as it is possible to make it, it has been rendered "fool proof," particular attention having been directed in its design to insure immunity from arcing and burning troubles and to render its operation easy and certain. Four speeds forward are arranged for. The first forward movement of the controller places the motors in series with resistances introduced; the second movement cuts out the resistance, the motors remaining as before, the third position places the motors in parallel and again introduces resistances, while the fourth and last position cuts out the resistance, but keeps the motors in parallel. The first backward position of the controller applies a powerful electric brake, while the second and third movements place the motors in series or parallel as before, but with their armatures reversed. The wheels are fitted with single tube pneumatic tires, but many of the carriages made by the company are now provided with solid tires, as it has been found that the special springs on which the carriage body is hung take up all road vibration and make the vehicle very easy riding. An ammeter and a voltmeter are fixed on the dashboard, and an emergency switch is provided, which, however, does not interfere with the action of the electric brake. The side lights and the headlight are lighted electrically with current supplied from the main cells.

British Imports and Exports of Automobiles

The returns relating to the British imports and exports of motor cars and cycles during August last show an increase both as regards the imports and exports. To deal first with the imports no less than 474 cars and cycles were imported last month, the value of the same being returned at £133,882. The value of the "parts thereof" is given as £8,001, so that we get a combined total of £141,883, as compared with £118,926 in July last. Some of these imports were only of a temporary character, being reshipped to foreign destinations. Thus last month the reshipments comprised eighteen vehicles amounting in value to £9,527 and £132 of parts, bringing down the net imports in August to £132,224. During the first eight months of the current year imports of foreign automobiles and parts into Great Britain have reached a net total of £710,288, representing over 2,700 cars and cycles. As regards the exports of automobiles of English manufacture, the shipments during the past month amounted to thirty-seven vehicles of a value of £20,230. Of parts the exports attained a value of £1,347, making a combined total for August of £21,577, as compared with £12,799 in July last. During the eight months ending with August, 213 British built motor cars and cycles have been exported, their value being roundly £94,700.

The Semmering Hill Climbing Races.

Reports state the hill climbing tests held by the Austrian Automobile Club on the Semmering mountain road on September 7 to have been a very successful event. The distance is 10 kilometre miles (6.21 miles) and the difference in level at start and finish 400 metres (1,333 feet), corresponding to an average grade of 4 per cent.

In the "light carriage" class a 6 horse power locomobile won in 15m., 12 2-5s., and in the heavy vehicle class C. Gray Dinsmore's Mercedes, driven by Werner, in 10m. 37 1-5s. There was also a prize contest reserved for members of the Austrian Automobile Club and a "sale" race in which were entered vehicles for sale.

The completion of the 6,000th motor bicycle at the works of Werner Brothers was celebrated by a banquet a short time ago.

According to the *Kammergericht* at Berlin automobiles are exempt from toll charges in Germany.

In addition to Capetown and Johannesburg, Bloemfontein will shortly have a public motor 'bus service.

The Daimler Motor Company, of Cannstadt has declared a dividend of 10 per cent for the last business year.

The German and Austrian automobile clubs are said to have under consideration a club tour from Vienna to Paris via Berlin to take place next summer.

After an inquiry by a French contemporary it has been found that the "Passe Partout" during the last days of August was stored at the works of the Kühlstein Company in Charlottenburg, Germany.

We understand that the latest development in racing machines in France is to dispense with the seat backs and to strap the driver down to the seat, leather straps weighing considerably less than the backs.

We read in *Graphite* that as late even as 1800 only five residents of New York city could afford to keep a coach, and that one of the owners referred to his as a "leather conveniency" as an apology for such worldly display.

The opponents of the automobile in England are advancing some queer arguments in behalf of their cause. A Rev. E. M. Gibson has calculated that in the 650 mile reliability trials the roads were damaged to the extent of £1,056 5s.

F. H Williams has opened a repair and storage station in Shanghai, China. Since Wu Ting Fang, formerly Chinese Minister to the United States, was an ardent automobilist it is hoped that the automobile movement will now spread in China

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Carl Bohl, of Eisenach, Germany, is contemplating the publication of an automobile touring guide for the whole of Europe and requests the co-operation of all those interested in such a work. He will send question blanks to anyone upon application.

According to the *Auto-Velo*, the De Dion-Bouton Company are building by thousands a cheap 6 horse power car, containing two seats, with room behind for a box or basket. The weight of the new car is about 700 pounds and the price will be $780, which is thought to be exceptionally low.

A number of gasoline motor propelled agricultural machines have lately been bought out in England. Ransoms, Sims & Jefferies, of Ipswich, have built a large motor lawn mower for use in the Kew Gardens, and the Ivel Company have introduced a motor tractor which in photo illustrations is shown as hauling plows, self binders, etc.

La Nature gives a formula for a rubber tire cement: Make first a solution of 30 grammes of rubber cut in very small pieces in 600 grammes of chloroform. Then prepare 30 grammes of rubber, also finely cut up, and melt it together with 12 grammes of rosin; add 90 grammes of Venetian turpentine and dissolve the whole in oil of turpentine. Finally the two solutions are mixed.

Legislative and Legal.

An 8 mile ordinance is recommended at Alameda, Cal.

An automobile ordinance is on the tapis in Muscogee County, Ga.

Four automobilists were arrested for excessive speeding at Babylon, L. I., on Monday, September 22. Three of them were fined $25 each.

Gabriel Caldron, a young auto driver, who was arrested for excessive speeding on the Ocean Parkway, Brooklyn, recently, pleaded guilty, and, it being his first offense, sentence was suspended.

Automobilists of Wichita, Kan., have prepared and presented to the council an ordinance fixing the speed of automobiles at 8 miles an hour in the business district and 12 miles elsewhere. Six miles an hour is the rate allowed in the parks.

Vernon Cassard, the Chicago automobilist, who ran over and killed a little girl the other day, was acquitted by the coroner's jury. It was shown that he was running very slowly at the time and that the victim was careless.

Howard A. Colby, of Llewellyn Park, Orange, N. J., who was arrested in New York last July on the charge of speeding his automobile faster than the legal limit, was acquitted last week by the Court of Special Sessions. The charge was not proved.

A local hackman is suing Park Densmore, of the Foster Automobile Manufacturing Company, Rochester, N. Y., for $375 damages, alleged to have been caused by the wrecking of his carriage and injury to one of his horses, which became frightened at Densmore's automobile, which, the plaintiff alleges, was being run at an unlawful speed. The defendant puts in a general denial.

Harry S. Woodworth, Rochester, N. Y., who was convicted on May 27 of violating the Cocks law and fined $50, and who appealed, based his defense on three contentions. He argued that the prosecution failed to show that the automobile was operated by him; that it was a reversible error to allow witnesses to testify as to the defendant's coming, as well as his going, through the town of Brighton; that the prosecution failed to produce any testi- ...ispute the defendant's evidence that it would have been impossib machine to have exceeded the s when the lever was on the seco

The Milwaukee automobile limiting speed to 8 miles an hour recommended for passage.

There are said to be about worth of automobiles in Paterso which are to be taxed at $1,500.

The city fathers of Binghamto who are trying to enforce their auto ordinance find that they ar flict with the State law and mu the ordinance.

J. B. Hughes is suing F. A. for $25,000 damages, claimed to owing to a runaway accident wh pened at Seabright, N. J., last when Warburg's automobile f Hughes' team.

The automobile ordinance wh been before the Pittsburg comm cil for some days limits speed in gested districts to 6 miles an hou the boulevards and avenues to an hour. The penalty for viol fixed at not less than $25 nor m $100.

The new automobile ordin Cleveland, Ohio, went into ef week. All machines must be n the numbers being of standard inches apart and in the centre of There are now 417 owners in th 210 of gasoline, 134 steam and 73 tric vehicles.

Henry G. Morris, president, a S. Muckle, vice president of the phia Automobile Club, has been a members of a committee, with re tives of the Road Drivers' Associa the Wheelmen's Society, to con the committee of the city council pare a suitable ordinance to reg forms of transportation within th Philadelphia.

The township committee of L N. J., has passed an ordinance lim speed of automobiles within the diction to 12 miles an hour and crossings. Machines must be st approaching frightened horses, an unattended must be properly against accident. Persons tamperi automobiles will be arrested. T alty for violation is not less than more than $15. Laurence townsh the direct line between New Y Philadelphia.

W. D. Guthrie's chauffeur Di discharged by Justice Wallace at Bay on the ground that the nove made timing device used by the sheriffs who made the arrest failed results with reasonable accuracy. paratus employed consisted of thr set up one-eighth of a mile ap strings stretched from one to anoth nected to a bell. When the vehicl the first post a deputy there pulls th which rings the bell at the midd The deputy there then sets his sto

ıd if the vehicle passes this post · he rings a bell at the last post eputy there arrests the offender. tem was proved to be inaccurate ts for the defense.

illburn (N. J.) township commit- :t to the new ordinance which the Board of Freeholders of Essex recently passed, giving automo- right to run at 20 miles an hour :ountry districts. They recently local ordinance making the limit ın hour, and are therefore in con- the freeholders. The matter may :ed.

ırging the grand jury of Bucks Pa., for the September term re- ıe court called attention to "the n oi nuisance that was menacing ic." referring to the automobile. common thing to read of deaths y the engines being run by reck- ı. who, by reason of their great think they owe nothing to the f the community. What farmer r's wife feels safe to hitch up and on the public highway by reason engines?" the judge said.

ıfety of the public on the high- subject for the consideration of d jury and they were instructed drivers who run engines at reck- :d can be arrested and indicted, tanding their social or financial The judge hoped that this plain of the law should have the atten- ıe constables and supervisors, and violation would be brought be- court where prompt justice would ł out.

ıutomobile Accidents.

Tom L. Johnson, who is cam- through Ohio in a red automo- caused several runaways in spite :ecautions against them, although iably asks for a bill of damages : sufferer.

ıe evening of September 23, as A. Marble, a driver employed by stchester Automobile Company, ı avenue, New York, in company B. Tuttle, a New Haven, Conn., ler, was driving toward Walling- ın automobile, he crashed into a ccupied by a local farmer and his lly injuring the first, seriously in- he second, and so maiming the ıat it had to be shot. The coro- y found Marble guilty of reckless- . held him under bonds.

ıobile Exhibit at Carriage Convention.

e Carriage Builders' Convention, łd at the Light Guards' Armory, Mich., from September 29 to Oc- the Westinghouse Electric and turing Company made an exhibit equipments for electric vehicles. ibit included a skeleton frame of a standard surrey equipped with an 80 volt, double, plain bearing motor equipment to demonstrate the applicability of this apparatus to existing types of carriage frames; a double motor equipment on a moderate size express wagon frame; an Adams express wagon with Westinghouse equipment which has been in service for seven months, and the various types of Westinghouse vehicle motors.

The Record of a Steam Truck.

On July 14 the Adams Express Company introduced the Herschmann steam truck into its daily delivery service in New York city. This vehicle was designed and built for the company and was described in the issue of April 16 of THE HORSELESS AGE. We are in a position to give our readers a few figures and data in connecnection with the operation of this goods vehicle, which has given very satisfactory service during a period of nine weeks. The truck was out of commission but one day, to braze a pipe in the feed water heating system. Mr. Herschmann stated that the machine could and should have been used on that particular day, despite the leakage.

The vehicle is not employed to carry loads between the depots of the company, but must deliver goods just as the horse drawn vehicles of like carrying capacity do it, from house to house, so that frequent stops are made. Under such conditions the fuel economy cannot well approach the results that would be obtained were the machine to be put to long runs without intermediate stops. The load carried varies quite a little, due to the nature of the service, and rarely exceeds 5,000 pounds or 2½ tons. The loading area is 10 feet by 4 feet 8 inches. Twelve hours constitutes a working day, and the average daily run exceeds 15 miles. The following table gives some figures, which are of interest and go to show that the company is beginning to put the truck to harder service than it was called on to do during the earlier period:

Date.	Day's Run. Miles.	Fuel Consumption. Lbs.
September 9........	30	200
September 10........	25	200
September 11........	26	200
September 12........	27	200
September 13........	20	150
September 15........	21	125

The total mileage to date is a little less than 1,000. Anthracite "nut" coal is the fuel that has been used exclusively. Originally a compound engine which had been designed by some inventor was given a trial. It proved to be a failure, so that Mr. Herschmann installed an engine of his own design, which has been propelling the truck since it has done regular duty. The dimensions of this engine are 3½ and 6x5 inches. The normal boiler pressure is 180 pounds per square inch, which is sufficient to drive the wagon anywhere in New York city without resorting to the low gear, which has never been used excepting to test it.

The front wheels are shod with Turner solid rubber tires of 42 inches diameter and of a width of 5 inches. On the driving wheels the tires are 54 inches in diameter, and of the same width. All the tires show wear and are chipped a little, but it is hoped that they will last for 2,000 miles in all. The tires in front are not in as good a condition as those in the rear. The designer attributes this to the unusually large rear wheels and to the fact that the steering wheels leave the car tracks at a sharp angle, whereas the rear wheels mount the rail when crossing it at right angles, or almost at right angles. Rails wear to a sharp edge on the inside and sometimes even have splinter shaped projections which dig right into a rubber tire and chip it.

No condenser is used in this system, the exhaust steam passing to the stacks on either side of the boiler. The water tank holds 130 gallons, or enough water for an average day's run. On one particular day there were 4 inches of water in the tank when the wagon returned to its station in the evening.

The A. C. A Elections.

As the time for the annual elections of the Automobile Club of America approaches various rumors are afloat as to dissensions in the organization and a probable change of officers and policy. Several interviews purporting to come from President Shattuck announce his intention to retire from the office which he has filled for two years and give someone else a chance, as he expresses it. Among the possible candidates for the vacant chair are Albert C. Bostwick and W. K. Vanderbilt, Jr.

The election will take place on November 17 and will no doubt be accompanied by some lively politics.

Additional Entries for Reliability Run.

Up to Monday evening six more entries had been received for the A. C. A. Reliability Run, bringing the total up to seventy-eight. The additional names are:

No.	Class.	Power.	Maker.	Entered by	Weight.	H. P.
73	B	Steam	Foster Auto. and Mfg. Co.	Dr. M. A. Carman	1,350	4
74	A	Gasoline	E. R. Thomas Motor Co.	Mechaley Bros.	995	6
75	B	Gasoline	Thos. B. Jeffery & Co.	Mechaley Bros.	1,100	4½
76	C	Gasoline	Fournier-Searchmont Co.	John Wanamaker	2,100	8
77	B	Gasoline	Thos. B. Jeffery & Co.	Col'mb's Auto. Ex.	1,200	4
78	B	Gasoline	A. Darracq & Cie, Paris	Col. W. P. Harlow	1,700	16

MINOR MENTION

Newberger Brothers, Parkersburg, W. Va., have taken the Olds agency.

The monthly meetings of the American Automobile Association will be resumed this month.

Rumors of an automobile club are again afloat in Pittsburg. Thomas R. Hartley is mentioned as a suitable president.

Mason engines were used by George C. Cannon on his record breaking car at Narragansett Park and Brighton Beach.

C. S. Drummond has accepted the presidency of the Manhattan Transit Company, organized to operate motor buses in New York city.

The Joliet races of the Chicago Automobile Club, which were to have occurred last Saturday were postponed on account of heavy rain.

The Niagara Motor Vehicle Company, Buffalo, N. Y., has gone into voluntary dissolution, and D. W. Sowers has been appointed receiver.

The P. J. Dasey Company, Chicago, Ill., have secured the selling agency for the "Ideal" gasoline engines, made by the B. & P. Company, Milwaukee, Wis.

The postmaster at La Crosse, Wis., has been authorized to receive bids for automobile mail delivery wagons for four years' service, beginning July 1, 1903.

A part of the second story of the new building being put up on Huron street, Cleveland, by the Winton Company, will be occupied by the Cleveland Automobile Club.

The Diamond Rubber Company, Akron, Ohio, have commenced operations on a branch factory at Glasgow, Scotland, in which American machinery is to be installed.

C. S. Gilbert, electrician of the Wyeth Hardware and Manufacturing Company, St. Joseph, Mich., has constructed a gasoline automobile which he intends to manufacture there.

Consular Agent W. D. Gordon, of Johannesburg, South Africa, in a recent communication to the State Department, calls attention to the brisk demand for automobiles in that rapidly developing section.

The Mountain Motor Wagon Company, of Prescott, Ariz., capital stock $1,000,000, has been incorporated by A. E. Nusbaum, P. L. Kimberly, Samuel Deutsch, M. Dreyfus, Fred Colburn, H. M. Ryan, Miles Finlen, George J. Atkins and T. G. Norris, to operate motor stages, etc.

The Meteor Engineering Company, Reading, Pa., successors to the Steam Vehicle Company of America, announce that they will place on the market in December the "Meteor" steam car with boiler in similar in design to a French gasoline touring car. A kerosene burner will be employed.

The Beardsley & Hubbs Manufacturing Company have decided to issue a certain amount of preferred stock to be sold to the present stockholders. The factory will remain at Shelby.

Fred C. Carter, of Watertown, N. Y., whose Buffalo gasoline tonneau was recently illustrated in our columns as climbing a steep grade informs us that the photo was not taken from an elevation, as it appeared to us.

The F. B Stearns Company, of Cleveland, announce that their 1903 model "Touring Car, the Second" will be out October 1. They state that they are behind in their orders and are working overtime to catch up.

Arthur J. Eddy, of Chicago, has just completed a 1,000 miles trip through Canada with a 15 horse power Panhard. They had no breakdown serious enough to delay them materially, and only caused one horse runaway on the entire trip.

It is rumored that the old Oakman Motor Vehicle Company's plant, Greenfield, Mass., may be used to make some of the parts of the Charron, Girardot & Voigt vehicles, as the Rome plant of the company is said to be overflowing with work.

The Standard Automobile Company, of Indianapolis, Ind., has been incorporated with $1,000,000 capital by William W. Spenser, John W. Holtzman and James H. Witty. The company intends to build a factory and manufacture gasoline motors.

The Troxel Manufacturing Company, Elyria, Ohio, have completed an experimental gasoline carriage and are now giving it severe road tests. It is their intention to organize a company for the express purpose of building automobiles and they will probably market their machine about January 1.

In San José, Cal., the insurance rates on buildings in which automobiles are stored have been raised, and some of the local dealers are thinking of moving their stores to buildings insured at lower rates. An automobile storage and repair station, a one story brick building, 40 x 60 feet, is to be erected on the corner of Market and San Carlos streets for C. H. Letcher, local agent for the Oldsmobile.

A. G. Southworth, who has managed the Brooklyn branch of the International Motor Car Company for the last two years, has acquired the stock, equipment and good will of his employers. He will continue the storage and repair business and act as agent for the Waverley electric, Toledo steam and gasoline vehicles. His place of business is at 342 and 344 Flatbush avenue, Brooklyn, New York.

At the meeting of creditors of the Steam Vehicle Company of America, held at Reading, Pa., on Saturday, September 20, ·as K. Dalzell, the trustee, reported ··· on hand of $9,900 with which to pay claims of ov George Alfred Lamb, treasurer funct company, was not present ination.

It is reported that the Friedm bile Company, of Chicago, have Champion gear as their transmis

The Columbus Motor Veh pany, a Delaware corporation, 000 capital stock, was admitte recently. The officers are: Pr W. Groff; secretary, C. W. G urer, Yeatman Wardlow, and J. general manager, all of Colum The shares are $100 each and ab capital is to be used in Columb

Charles J. Roe, of Jersey Cit appointed temporary receive American Electric Vehicle Co Newark, N. J., one of the many tric stock schemes, which was at $6,000,000 and was backed by J. Herbert Ballantyne, wh made an assignment. The asse to be about $57,000 and the about $80,000.

Homan & Schulz, who have ating an automobile storage, sal pair station on upper Broad York city for some time, have o store at 134 West Thirty-eigh which will be known as their branch. They have secured t for the "Northern" gasoline ve will devote the 2,500 square fe space to the display and stora chines of that make.

The German-American A Company, 134 West 143d str York city, has been petitioned solvency by the following credit Macnaughton, $1,708, for four salary as general manager at $5,0 John L. Schultz, $425 for tw salary as superintendent of the $3,000 a year, and Bain & La materials. It is alleged that the has paid money and turned over assets to certain creditors to pr The company was incorporated o 22 last, with a capital stock o W. N. Beach is president and T Gillespie treasurer.

The Hansen Automobile Cleveland, Ohio, have changed t to the General Automobile Man Company, and have moved the to 1312 Hamilton street, where a much larger floor space and n tools. By January 1 the output ceed one a day. The 1903 mod in a number of respects from the model. It will have a double cyl gine of 8 horse power. The s steering will be replaced by a wh touring wagon will have two c vertical engines of 16 horse pow in front under the regulation ho new models will be ready for ma tober 1. The officers of the new are R. Hansen, president; J. C. vice president; E. H. Penning. and treasurer.

VEHICLES AND PARTS.

›ward Shifting Change Gear.

Howard, of Troy, N. Y., has out a variable gear of the shifting of which a sectional view and an ation are here shown. The gear ee speeds forward and one reverse, he high speed drives directly, with ears running idle.

ing to the sectional view, Fig. 1, r of the two shafts is the driving is in two parts, the left hand part g into the other, being journaled n a bronze bushed bearing. This l part of the shaft is made to ex- considerable length outside the in the casing, to be cut off as the location of the engine and gear the design of the friction clutch uire.

ear contains only two shifting and E, which are formed integral, gears proper being connected by d neck. This pair of gears slides eather key in the part of the upper the right of the drawing. The gear dly keyed to the part of the upper own on the left and constantly re- mesh with the gear B on the lower ese two gears being of the same . Besides the gear B there are the lower shaft the pinions D, E which correspond to the second d forward and the reverse speeds ely. Pinion H is in mesh with an liate pinion G, which is supported ngs in the wall of the casing and projecting from the wall of the espectively.

be seen that the gear C is pro- ith two pins, S and P, projecting from its left hand face and the

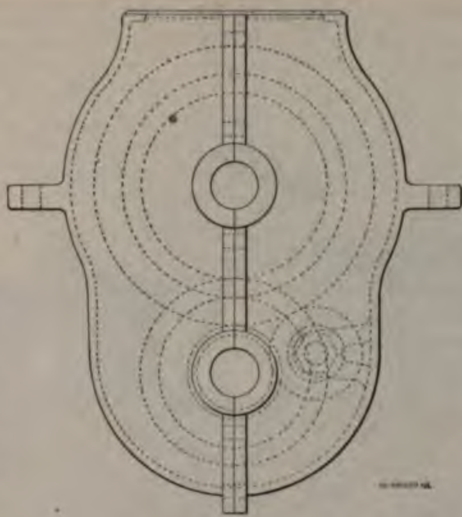


FIG. 2.

gear A with sockets for these pins. When the shifting gears are in extreme position to the left these pins engage in the sockets and the two parts of the upper shaft are then locked together, causing the power to be transmitted directly. The countershaft then runs at the same speed as the engine, the same as for any other position of the shifting gears. When the shifting gears are moved to the right, to the position they are shown to occupy in the drawing, where gear C is in mesh with pinion D, the second speed is obtained. When the shifting gears are shifted farther in the same direction, after gear C and pinion D are out of mesh, gear E meshes first with pinion F, giving the lowest forward speed, and finally with the intermediate pinion G giving the reverse. The gear is controlled by means of a single lever and is inclosed in a closed casing of either cast iron or aluminum. It is made in two sizes, one for light and medium weight carriages and one for touring cars.

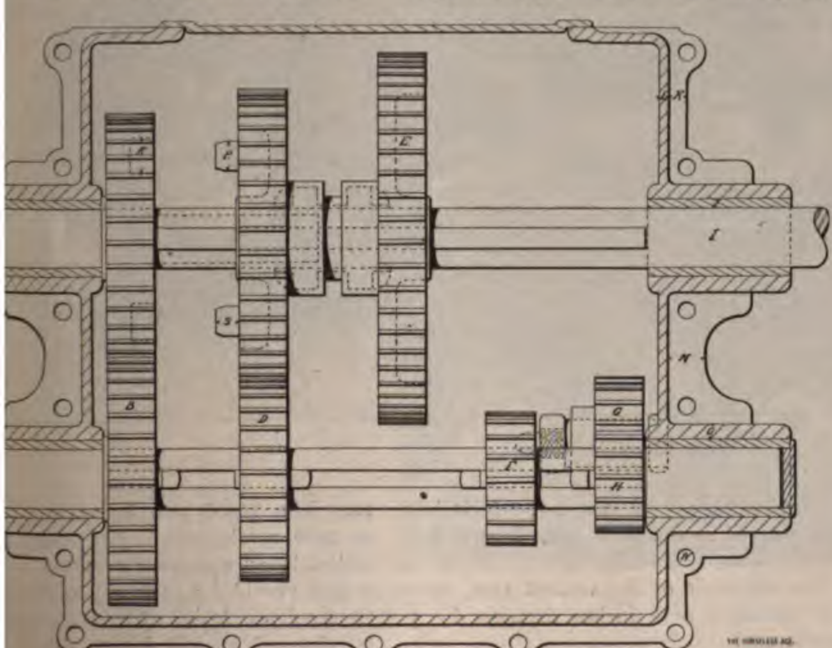


FIG. 1.

The Webster Gasoline Cars.

The Webster Automobile Company, of 10 West Sixtieth street, New York, are manufacturing a new car of French type, of which we give an illustration herewith.

This vehicle has a wheel base of 7 feet 6 inches with the standard 56 inch tread.

Standard wood wheels are used, with twelve spokes, and have front tires 32x3½ and rear tires 34x4.

The hubs are of bronze; Palmer springs are employed; live rear axle; bevel gear drive of large diameter and face.

The transmission gears always remain in mesh and give three speeds forward and one slow reverse. At high speed the drive is direct, no gears working. The engine is of the four cylinder, balanced type, of

THE WEBSTER.

16 horse power. The cylinders are of 4¼ inch diameter and 5¼ inch stroke.

The normal speed is 750 revolutions, controlled by governor, and may be reduced to 100 revolutions by the use of a moderator for slow running through crowded thoroughfares.

The car can be run at the desire of the operator at from 5 to 45 miles an hour, by the operation of the moderator or accelerator pedals, while running on the direct drive.

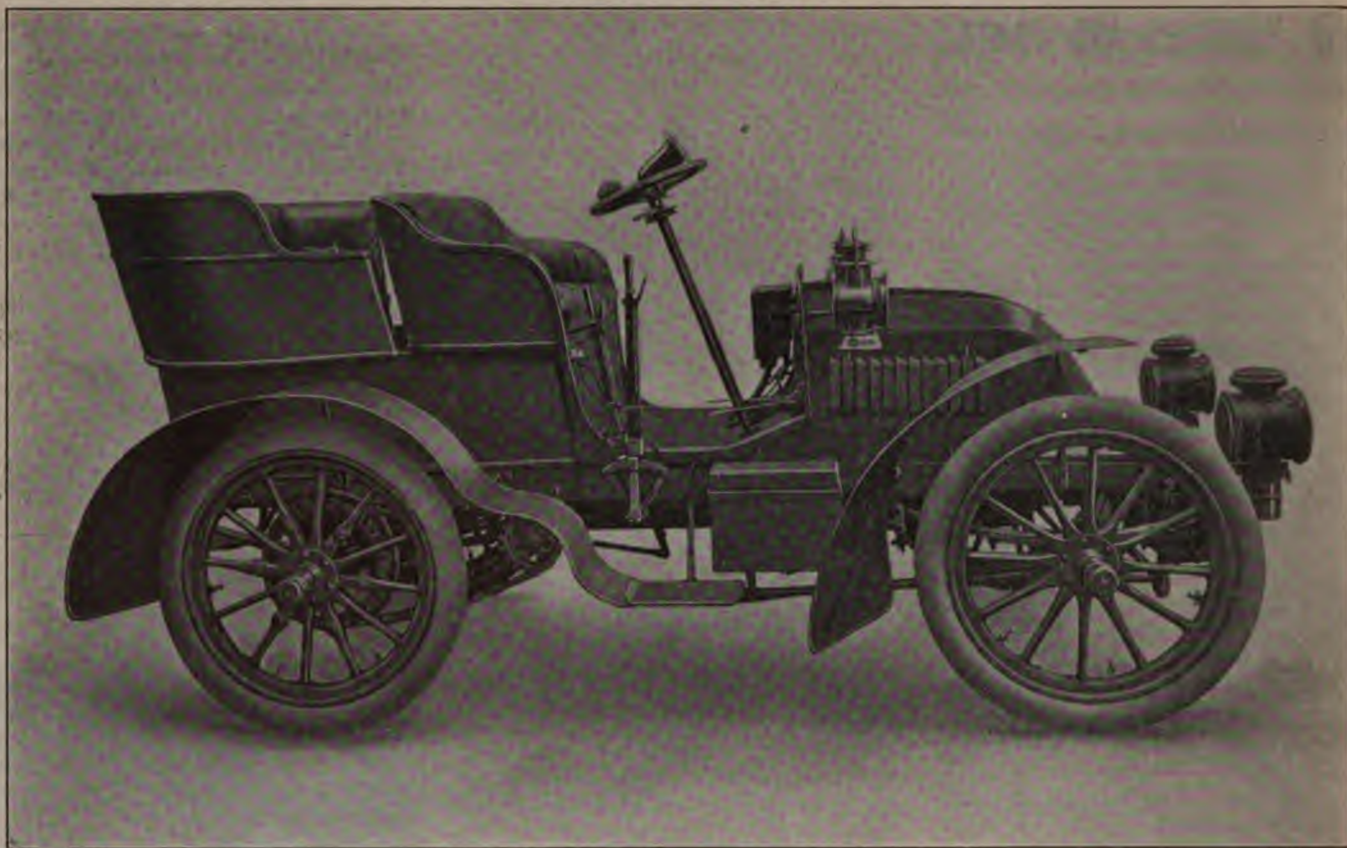
The car is fitted with three brakes: a transmission brake operated by a pedal, which first disconnects the clutch, and two rear hub double action band brakes operated from a lever outside the driver's seat.

The speed change is controlled by one lever. Jump spark ignition is employed, which permits starting the engine, after a short stop, without cranking, by pushing in a switch. A Dayton dynamo is used for operating after the start has been made.

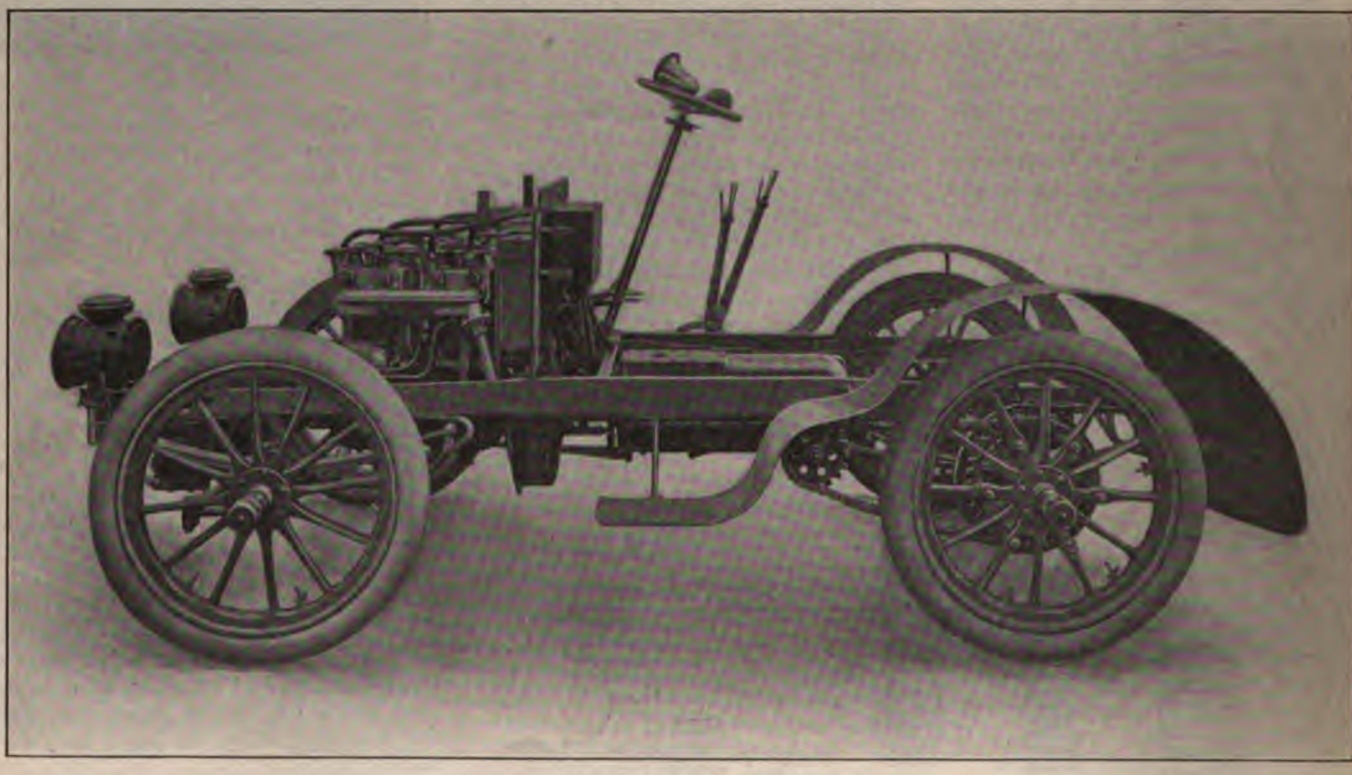
The centre of gravity of the car is low, the floor being 24 inches from the ground, and the clearance is 11 inches under the lowest part.

Ball bearings are applied to both front and rear axles; lubrication is from the front on dashboard.

The bodies are molded after the latest French model, the upholstery being in a heavy morocco of fine quality.



THE LOCOMOBILE GASOLINE TOURING CAR.



WITH BODY REMOVED.

The Locomobile Gasoline Touring Car.

The Locomobile Company of America has just tested its first gasoline car, which was designed and built for it by A. L. Riker, and is now preparing to manufacture it for the market.

The description of this car, which has been entered in the New York-Boston Reliability Run, is as follows:

The engine is of the vertical type, with four cylinders of 4 inches diameter by 5 inch stroke.

The normal engine speed is 900 revolutions, and the nominal horse power is about 12. The speed may be varied from 1 to 2,000 revolutions. The speed is co trolled by an automatic governor, and the is also provided a manually operated thro tle regulator device whereby the speed ma be changed at will independently of th governor.

The engine construction is simple, tw

cylinders, with cylinder head, water jackets and valve boxes being all of one casting. There are no joints at all except where the admission valves are located.

A particular feature of this engine is the ease with which the inlet and exhaust valves may be gotten at; a hollow yoke held in place by one bolt retaining the inlet and exhaust valves in position for each pair of cylinders, and forming the necessary atomizer connection; therefore, by simply removing two nuts all eight valves may be removed without disturbing the atomizer connection.

It should be mentioned that in removing the exhaust valves, it is further necessary to release the closing spring.

The fact that the admission valve is situated directly over the exhaust valve serves to keep the latter cool in operation, because the evaporation from the gasoline strikes directly thereon.

Hot air from the exhaust keeps the mixture in proper condition.

Restarting is effected by the operation of a switch to throw in the spark connection.

Air heated by contact with the exhaust pipe prevents the atomizer from freezing in cold weather.

We understand that this has been accomplished after the engine has been quiescent for one hour and a half.

Ignition is by combined storage battery and dynamo system, the jump spark being employed, with large, specially made coils. Four cells are carried as the battery equipment, only two cells being used at a time, and while these are only intended for use in starting, it is stated that two cells have served independently in operating the car over 1,000 miles of road. The weight of the engine complete, including the 70 pound flywheel, the dynamo, pump and atomizer, is 443 pounds.

The transmission provides for three forward speeds and one reverse, the changes being effected by sliding gear. On the high gear the drive is direct, and the reduction to the low gear is as 12 to 1. It is stated that the car can be driven as low as 4 miles an hour on the high gear, its maximum speed being very high.

The radiating coils are of the usual French type, having disks, the water for cooling the engine being supplied by a positive, gear driven pump. A new feature in the friction clutch, which is of the spring actuated cone type, is that it is without end thrust. It is released from engagement by the foot brake, which acts upon the differential shaft.

A hand lever is used to apply the band brakes on the rear wheels, which are provided with the usual brake drums.

The chassis is constructed entirely of steel, and consists of two one piece bars, which are in channel form between the springs, but taper out at each end in angle form, thereby combining the qualities of lightness and great strength with a desirable flexibility.

The usual steering wheel with irreversible mechanism is employed.

The gasoline tank capacity is 15 gallons, and water tank 7 gallons. The latter is located at an elevation in front of the dashboard, so that in case of trouble with the pump a thermo-siphon action takes place. The oil reservoir and its connections are also situated in front of the dash, under the bonnet, where they are out of the way, and the danger of soiling the clothes by contact with them is avoided.

This location of the oil reservoir, by its proximity to the engine, keeps the oil warm and of a suitable consistency.

The wheel base of the car is 82 inches, and the tread is 51 inches. Thirty-four inch artillery wheels are used, both front and rear, fitted with 3½ inch double tube clincher tires.

At present the drip pan alone of the whole mechanical structure is composed of aluminum, but it is intended to provide bodies of this material.

The section supporting the engine is made of bronze, and in no part of the car has strength been sacrificed for the reduction in weight.

The total weight of this car, fitted with wooden body (for testing), is 2,175 pounds.

The tonneau is so designed as to seat three persons comfortably, the seats of the aluminum body being of the type known as the "King of the Belgians."

It is intended to build also a smaller car, having only two cylinders of same dimensions.

New Attachment Fittings for Jones Speedometer.

The accompanying illustration (Fig. 1) shows a bearing bracket for Jones speedometer driving gear for attachment to the steering knuckles of Panhard cars, and in

Fig. 1.

Fig. 2 is shown the method of attachment of the speedometer itself to the dashboard of the vehicle. Mr. Jones reports that ow-

Fig. 2.

ing to the enforcement of speed restrictions in many localities recently there has been a large demand for his instrument, which is now made with scales reading to 30, 50 and 100 miles an hour, and also with a kilometre scale for export to Europe. An improvement has been effected in the driving gear for steel wire wheels, a fastening for the driving pulley having been devised which is self centering and can be put in place by any amateur. In the case of most light carriages the instrument is clamped to the steering knuckle and is provided with an adjustable bracket, which will fit practically any knuckle.

Paint for Parts Subjected to High Temperatures.

As a paint for parts subjected to high temperatures the following preparation will be found very durable, and will not turn white or gray when exposed to excessive heat, the same as ordinary black paints. Procure 2 pounds of black oxide of manganese, 3 pounds of black lead, 9 pounds of terra alba. Mix well together and pass through a fine sieve, then mix to the required consistency with the following preparation: 10 parts silicate of soda (soluble glass), 1 part glucose, 4 parts water.—*English Mechanic.*

Trade Literature Received.

The Century Steam Automobile.—The Century Motor Vehicle Company, of Syracuse, N. Y.

Hoffmann Motor Cars.—The Hoffman Automobile and Manufacturing Company, of Cleveland, Ohio.

Anti-Friction Bearings. Henry R. Lordly, C. E. (Reprinted from Transactions of the Association of Civil Engineers of Cornell University).—Wright Taper Roller Bearing Company, of Buffalo, N. Y.

List of Automobile Clubs and Organizations.

UNITED STATES.

American Automobile Association, 753 Fifth avenue, New York city. S. M. Butler, secretary.
Automobile Club of America, 753 Fifth avenue, New York city. S. M. Butler, secretary.
Chicago Automobile Club, 243 Michigan avenue, Chicago, Ill. Walter L. Githens, secretary.
Automobile Club of Philadelphia, 250 North Broad street, Philadelphia, Pa. Frank C. Lewin, secretary.
Massachusetts Automobile Club. L. E. Knott, secretary, 16 Ashburton place, Boston.
Long Island Automobile Club, 1190 Fulton street, Brooklyn, New York. L. A. Hopkins, secretary.
Automobile Club of California, 415 Montgomery street, San Fracisco, Cal. A. C. Aiken, secretary.
Automobile Club of Bridgeport. F. W. Bolande, secretary.
Albany Automobile Club, 99 Central avenue. F. G. Robinson, secretary.
Automobile Club of Cincinnati, 30 West Seventh street. Dr. L. S. Cotter, secretary.
Automobile Club of Illinois. M. Scott, secretary, 1251 Marquette Building, Chicago.
Automobile Club of Indiana. A. J. McKim, secretary, Indianapolis.
Automobile Club of Kansas City. W. L. DeLa Fontaine, secretary.
Automobile Club of Maine. Henry M. Jones, secretary, 29 Pearl street, Portland.
Automobile Club of New Jersey. W. J. Stewart, secretary, 8 Central avenue, Newark.
Automobile Club of Omaha. Dalton Risley, secretary, Omaha, Neb.
Automobile Club of Rochester. Frederick Sager, secretary, 80 West Main street, Rochester.
Automobile Club of San José. B. D. Merchant, secretary, San José, Cal.
Automobile Club of St. Louis. E. M. Senseney, secretary.
Automobile Club of Syracuse. F. H. Elliott, secretary, 515 S. A. and K. Building.
Automobile Club of Trenton. Edward S. Wood, secretary, Trenton, N. J.
Automobile Club of Utica. James S. Holmes, Jr., secretary, Huron Building, Utica.
Berkshire Automobile Club. L. A. Merchant, secretary, Pittsfield, Mass.
Bloomsburg Automobile Club. C. W. Funston, secretary, Bloomsburg, Pa.
Brockton Automobile Club. Harry T. Keith, secretary, Campello, Brockton, Mass.
Bronx Automobile Club. F. M. Jeffries, secretary.
Buffalo Automobile Club. Dr. V. Mott Pierce, secretary, 663 Main street, Buffalo.
Cleveland Automobile Club. George Collister, secretary.
Colorado Automobile Club. Dr. W. H. Bergtold, secretary, Denver, Col.
Columbia University Automobile Club. R. C. Gaige, secretary, Columbia University, New York city.
Columbus Automobile Club. Campbell Chittenden, secretary, Broad street, Columbus, Ohio.
Dayton Automobile Club. E. Frank Platt, secretary, Dayton, Ohio.
Des Moines Automobile Club, Des Moines, Iowa.
Grand Rapids Automobile Club. John T. Byrne, secretary, Grand Rapids, Mich.
Hartford Automobile Club. Walter G. Cowles, secretary, Hartford, Conn.
Herkimer Automobile Club. W. I. Taber, secretary, Herkimer, N. Y.
Hudson County Automobile Club. Frank Eveland, secretary, 52 Madison avenue, New York city.
Indianapolis Automobile Club, Indianapolis, Ind.
Jersey City Automobile Club, Jersey City, N. J.
Milwaukee Automobile Club. C. G. Morton, secretary.
National Capital Automobile Club. E. M. Sunderland, secretary, Washington, D. C.
New Bedford Automobile Club. E. G. Watson, secretary, New Bedford, Mass.
North Jersey Automobile Club. Edward T. Bell, Jr., secretary, Paterson, N. J.
North Shore Automobile Club, Beverly, Mass. Quincy A. Shaw, Jr., secretary.
Pennsylvania Automobile Club. Henry J. Johnson, secretary, 138 North Broad street, Philadelphia.
Princeton University Automobile Club. Charles H. Dugro, secretary, Princeton, N. J.
Rhode Island Automobile Club, P. O. Box 1314, Providence, R. I. B. S. Clark, secretary.
San Francisco Automobile Club. B. L. Ryder, secretary, San Francisco, Cal.
Springfield Automobile Club. M. T. White, secretary, Springfield, Mass.
Troy Automobile Club. J. S. Thiell, secretary, Troy, N. Y.
Toledo Automobile Club, Toledo, Ohio.
Topeka Automobile Club, Topeka, Kan.
Worcester Automobile Club. H. E. Shiland, secretary, Worcester, Mass.
Automobile Club of Maryland. C. Warner Storck, secretary, Altamont Hotel, Baltimore, Md.
American Motor League. Frank A. Egan, secretary, 174 Broadway, New York city.
National Association of Automobile Manufacturers, 7 West Forty-second street, New York city. Harry Unwin, secretary.

GERMANY.

Deutscher Automobil-Verband, Berlin, Sommerstrasse 4a. Duke of Ratibor, president.
Deutscher Automobil-Club, Berlin, Sommerstrasse 4a. Duke of Ratibor, president.
Automobil-Club für Elsass-Lothringen, Strassburg, i. E. M. Schutzenberger, president.
Automobil-Union, Oberwallstrasse 16a, Berlin, W. E. Reiss, president.
Automobil Club der Mark Brandenburg, Berlin (Hotel Kaiserhof).
Berliner Automobil-Verein, Theater des Westens, Berlin. Major a. D. Roland.
Bayrischer Automobil-Club, Mozartstrasse 9, Munich. Chr. L. Poehlmann, president.
Bayerischer Motorwagen-Verein, Findlingstrasse 33, Munich. Friedr. Oertel, president.
Breisgauer Automobil-Club, Freiburg, i. B., Stadtstrasse 7. Wilfred Banner, president.
Colner Automobil-Club, Georgsplatz 17, Cologne o. Rh. Carl Hub. Weber, president.
Dresdener Automobil-Club, Dresden, Dippoldiswaldaergasse 15. Hans Dieterich, president.
Dresdener Touren-Club (Automobile section), Hotel "Furst Bismarck," Dresden-A., am Neumarkt.
Erster Stettiner Automobil-Club, Stettin. Franz Ruschke, president.
Frankfurter Automobil-Club, Guntherburgsalle 14, Frankfort, a. M. Dr. Mollison, president.
Frankfurter Motorwagenverein. Frankfort o. M., Hotel Furstenhof.
Frankischer Automobil-Club, Nurnberg. L. Schutte, president; A. Louis, secretary.
Hannoverscher Automobil-Club, Hannover, Theaterplatz 16a. O. Schrader, president.
Hallescher Automobil-Club, Halle, a. S., Hotel Rothes Ross. F. R. Liebau, president.
Leipziger Automobil-Club, Elisenstr. 12, Leipzig. Arthur Klarner, president.
Mitteldeutscher Automobil-Club, Eisenach, Hotel Thuringer Hof. G. Ehrhardt, president; Carl Bohl, secretary.
Mitteleuropaischer Motorwagen-Verein, Berlin, N. W., Universitats str. 1. Count Talleyrand-Perigord, president.
Verein Deutscher Motor Fahrzeng Industrieller, Cannstadt. G. Vischer, president.
Norddeutscher Automobil-Club, Hamburg. H. Hasperg, Jr., president.
Rheinisch-Westfalischer Automobil-Club, Dusseldorf, Hotel Monopol-Metropol. R. de Temple, president.
Rheinischer Automobil-Club, Mannheim. Eugen Benz, president.
Schlesischer Automobil-Club, Breslau, Am Rathhaus 25. Prince Hans Heinrich von Pless, president.
Allgem. Schnauferl-Club, Munich. Gust. Braunbeck, president.
Vereingung Sachs. Automobilen-Besitzer, Dresden, Zoologischer Garten. Dr. Ernst Andreas, president.
Westdeutscher Automobil-Club, Aachen (Nuellens Hotel). Dir. Kupper, president.
Wurtembergischer Automobil-Club, Stuttgart. A. Pfautsch, president.
Westfalischer Automobil-Club, Bielefeld. (Hotel Geist.)
Brunswick Automobile Club, Brunswick. (Hotel Petersburg.)

BELGIUM.

Automobile Club de Belgique, 14 Pl. Royale, Brussels. Count de Villegas de Saint-Pierre, secretary.
Automobile Club de Charleroi, 18 Quai de Brabant, Charleroi.
Automobile Club de Flandres, 7 Place d'Armes, Gand.
Automobile Club, Liegois, 2 Rue Hamal, Liege.
Automobile Club Anversois, 34 Rue Longue de l'Hopital, Antwerp.

FRANCE.

Association Generale Automobile, 6 Place de la Concorde, Paris.
Automobile Club de France, 6 Place de la Concorde, Paris.
Automobile Club de Picardie, 36 Rue de La Hotoie, Amiens. Albert Jumel, president.
Automobile Club d'Avignon, Avignon. Joseph Pernod, president.
Automobile Club Bordelais, 2 Place de la Comédie, Bordeaux. M. Puisarnaud, secretary.
Automobile Club Bourguignon, Café Americaine, Dijon.
Bicycle et Automobile Club de Lyon, Lyon.
Moto-Club de Lyon, 3 Place de la Bourse, Lyon.
Automobile Club de Marseilles, 61 Rue St. Fereol, Marseilles.
Automobile Club Lorrain, Thiers pl., Nancy.
Automobile-Velo Club de Nice, 16 Rue Chauvain, Nice.
Automobile Club Normand, 4 bis Boulevard d'Orleans, Rouen. M. Bonneman, secretary.
Touring Club de France, 5 Rue Coq-Heron, Paris.
Automobile Club Bearnais, Ave. de la Pau, Pau.
Veloce Club Perigourdin, Hotel de Commerce, Perigueux. M. H. Soymier, secretary.
Automobile Club Toulousain, Café Riche, Place St. Etienne, Toulouse.
Société des Chauffeurs du Midi, 25 Rue Roquelaine, Toulouse.
Automobile Club Bitterois, Allée Paul M. Ch. Viennet, president.
Automobile Club du Centre, 34 Rue St Clermont-Ferrand.
Automobile Club Dauphinois, Place Grene A. Pegoud, president.
Automobile Club de Provence, 23 Rue biere, Marseilles.
Federation des Automobile Clubs du Su Rue St. Fereol, Marseilles.
Chambre Syndicale de l'Automobile, 6 la Concord. Marquis de Dion, presid
Automobile Club de Salon, Cercle des Métiers, Salon. Ferdinand Bertin, pre
Société Amicale des Conducteurs-Mé d'Automobiles, 70 Ave. de la Grande Paris.

SPAIN.

Automobile Club of Madrid, Madrid.

ALGIERS.

Automobile Club of Algiers, Algiers.

SOUTH AFRICA.

Automobile Club of South Africa. J. W. son, secretary, Cape Town, S. A.

GREAT BRITAIN.

Automobile Club of Great Britain and 119 Piccadilly, London, W. C. Johnso tary.
Scottish Automobile Club, 4a St. Andrew Edinburgh. R. J. Smith, honorary se
Irish Automobile Club, Dublin, Ireland.
Liverpool Self Propelled Traffic Associat Shrapnell Smith, honorary secretary, stitution, Colquit street, Liverpool.
Manchester Automobile Club. J. Hoyle honorary secretary, 37 Cross street, Ma
Yorkshire Automobile Club, Leeds. Lord wald, president.
Lincolnshire Automobile Club, Lincoln. Pennell, president.
Midland Automobile Club.
Nottingham and District Automobile C R. Atkey, secretary, Black Boy Hot tingham.
Motor Union, 119 Piccadilly, London, W.
Sheffield Automobile Club, Sheffield.
Reading Automobile Club, 1 Minster stre ing.
Leicester and County Automobile Club. Peterson, secretary, 9 Beatrice road, L

HOLLAND.

Neederlandsche Automobil Club. H. A. nema, Nassauplein 1b, The Hague.

AUSTRIA-HUNGARY.

Austrian Automobile Club, 10 Kärnth Vienna I. Josef Fellner, secretary.
Tiroler Automobil Club, 3 Rudolph str bruck.
Prager Automobile Club, Prague.
Hungarian Automobile Club, 31 Museum Budapest.

ITALY.

Club Automobilisti Italiani, 14 Villa Viv lan. Cav. F. Pizzagalli, secretary.
Automobile Club d'Ital, 26 Via Vittor manuela, Turin. Count Biscaretti di president.

RUSSIA.

Automobile Club de Russie, St. Petersbur
Automobile Club de Moscow, Moscow, P Hauschnow.

SWITZERLAND.

Automobile Club de Suisse, 2 Rue de Geneva. Alois Naville de Fontenex, pı

A Motor Bicycle Tour on the tinent of Europe.

By Joseph Pennell.

It was drizzling when in the companion and I landed at Diep had poured all the way from L We wondered what the customs would do. Would they let us Should we have to pass an examin They did nothing, save show a stro sire to get rid of us and close place. The dreaded examination wa in five minutes, and cost 60 centim

How uncanny were the black streets in the dark hour before the There was no crowd to cheer us o the only sounds in the wet, cold da were the exhausts crackling like firers as we went at the hill on the road, the first step on the way to

for Florence, at the end of a line drawn across France and Italy, was to be our turning point. Up we went; but though I have climbed that hill often enough on bicycles and tricycles, it never seemed so long before, and it never was so steep. The farther up I got, the steeper it grew and the longer it seemed and the slower I went, and no twiddling with taps or shoving on pedals would make the wretched thing catch the other machine which was gaily purring its way up and out of sight ahead, leaving me further and further behind. Slower and slower the cycle ran till, with that expiring grunt all motorists know, over it went sideways. How I raved to the blackness! Was this machine, which had carried me over every hill almost in central England, to jibe at the first rise in France? Well, its maker was at the top, and we would see. But he had gone up gaily and well. I caught him finally, and then, in the cold gray dawn, we ploughed through the mud, we crawled up the hills and slid down them, and we bumped into Rouen just as the town was waking up. We stopped for a worse shower than usual. We had a second breakfast, and then we tried to start. Neither could. Oh, the agony of it! And the wind blew, and the rain fell, and the crowd under umbrellas made remarks. There was nothing for it; then and there the machines came to pieces. The valve of one was stuck, and the other burnt, but we fixed them—or rather the mechanical one did, while I looked on holding things and learning lots. How I hated it. Then we tore to Pont de l'Arche, and we wallowed in rain and mud to Louviers, and a little after noon to Evreux, and then we gave up. Rain in sheets, roads like rivers. Not being paid, we spent the rest of the day cleaning the mud out of our hair, and the oil out of our leathers. We only sallied out once, and then we were, not unnaturally, taken for English—who else would have been abroad in such a storm looking at churches?—and cheering remarks were addressed to us concerning the Transvaal. But as one of us was a Dutchman and the other an American, the person—rather under the influence of strong waters—who made them was informed of his error and removed.

Next morning there was a little bit of blue away down south in the sky. So we left. The wild head wind had dried or blown away the mud, and we tore along against it, buttoning up our coats to keep warm. Yet can I ever forget the agony, on an ordinary machine years ago, when I tried to cross the same plain of La Beauce against the same head wind? It then took me long hours to get to Dreux. But as 12 o'clock struck the other day we muddily puffed our way up into Chartres, followed by a crowd carrying all the belongings which the maker, his bag opening, was scattering through the streets, an unconscious sort of Santa Claus on a motor. We lunched, we smoked, we "did" the town. Everybody knows it, or they should. We took the long road without a turn that stretches straight away to Orleans, the terror of all cyclists, the joy of all motorists. Despite the fact that the rain soaked machines would go wrong every little while, and that one of us was always waiting for the other, Orleans Cathedral came up above the horizon soon after Chartres sank below it, and then the rain came down again and we bumped into Orleans. Next morning, in a dense fog, we left. We tried to make a long run without a stop, and I remember we broke something, somewhere, and then it cleared up, and we spent hours and hours in a machine shop, and then it was lunch time. Lunch time and dinner time were always coming and were always welcome. But the afternoon was lovely by the poplared Loire, though here and there the river had got out of its bed and over the road, and we had to ride through water pedal deep. We went past Cosne and La Charité, and about 4 came to Nevers. We would go on to Moulins, at least, that night. But the machines wouldn't. Something—I forget what—went wrong; so we spent five more hours in a repair shop, and that was all I saw of Nevers.

Next day we vowed we would make a record and reach Lyons—and so we should if the batteries hadn't run down, and it hadn't poured, and various things hadn't happened. As it was, we climbed Mount Tarare in the twilight, 23 kilometres, only to run into a furious storm on the summit, and at the first town we came to we were only too glad to stop.

The next day was all right, and Lyons was soon reached. But there were lots of things to do, and it was not till late that we got off. Before night, however, we were in Valence, having covered in about half a day what had always taken me two hours before, and the next morning we lunched at Orange, flying before the mistral. We flew by Avignon and Orgon on the way to Aix—on the way, yes—that is the way with motors. Almost in sight of that town we spent hours by the roadside, but this time, as always, we made the machines go in the end. It was usually only a little thing; too much of this, too little of that; but oh, the finding of it! The last days of France, things are a blank; the scorch to Fréjus; the sight of a motorist, the sudden yell of horror as a cart loomed out of the dusk of the twilight ahead, blocking all the road, and the even more sudden dive we took into ditches—nothing happened—it is extraordinary, as the maker said, what these little machines will stand; later, the gipsy camp by the roadside, the bright light of the fires, the astonished faces silhouetted in the darkness; the crossing of the Esterel almost without a pause; and then, almost at Cannes, the smashing and grinding as of a dozen coffee mills inside my machine. Only a tiny spring was broken, but it took half a day to mend it. Then came the blue sea, and the palms, and the sunlight, and then Nice, and dust, and trains, and autos. We had been a week on the way, and not more than four days' actual riding, and we had driven the little machines every foot of the 801 miles from Dieppe to Nice; almost as great a distance as from Paris to Vienna. And yet, I was only just starting on my tour, for from Nice I meant to go on alone.

Driving a motor bicycle, when you have a man who understands its crankiness with you, is easy enough, provided he looks after it. But even then, if the machine takes it into its head to be sulky, it easily can, and on this part of my tour I don't think there was a day that something did not go wrong with my machine. But to the other one—they were both the Phœnix—nothing happened. We finally found out the cause; it was defective lubrication on mine, and that is the root of nine-tenths of all motor mishaps. But I had had so many smashes that I did not see how anything else could happen, and so, as the maker had to return, we mildly celebrated our arrival and blew our own horns. We were casually and patronizingly welcomed by the lights of automobilism then gracing Nice with their presence.

A couple of years ago I crossed the Alps on a motor bicycle, and no one has, so far as I know, done so since. I then maintained that the motor bicycle was the coming vehicle. Of course I was universally laughed at. Today, everywhere, this is admitted. The other day a 2 horse power motor bicycle made the run from Paris to Vienna in only ten hours more than the fastest, a 70 horse power car, and our run out to Nice was done in remarkably good time, far better than that made by the average car. So far as I remember, there was not a day without a storm. A racing car could easily have beaten us, and one did, but we had not the slightest trouble in passing two or three touring carriages we saw; while as for ordinary bicycles, considering we only rode a few hours a day, I am afraid their riders would have had a bad time if they had tried to follow us. Some who did seemed to find a mile quite enough. The motor bicycle is a thing of moods—mine sulked nearly all the way. The other went splendidly. But the worst motor bicycle I ever saw is better than the best pedal shoved safety I have ever ridden. But Italy is almost in sight from Nice, and I hoped for better luck, though not better roads over the frontier.

BAD WEATHER AND BREAKDOWNS.

Surely it seemed to me once out of Nice everything on the way to Florence must be charming. And it was as soon as the trams and the mud were left—for a few minutes. Then, round a corner on the wrong side, came one who, I suppose, would call him-

self a "chauffeur"; a few years ago he was a "bikist"; I fled to the wall, just missing a tram coming up behind me, and he rushed by. As a "bikist" he was bad enough, but in a motor car he is terrible, and on the winding, clinging Riviera you never know when he is coming. He and the trams have spoiled it all, and it is but rarely that one can look at the gorgeous, ever changing pictures which compose themselves at every turn. Still, nothing uncanny happened, and Mentone and the French frontier were passed; the French guards at one end rather unwilling to let me pass the bridge into Italy, the Italians at the other not caring whether I came in or stayed out.

Then the grind up the hill to the Italian customs, and the half hour's formalities which a government, incapable of putting into force a law they have passed, allow to drag on. What a hill there is beyond! It mounts along the cliffs to a lighthouse, which seems to hang over Ventimiglia. I did not know even if I could get on the machine; I was not sure I could drive it to the top if I did! I had failed in both the previous year. This time I succeeded, though the road was the worst I had come over from Dieppe. Some more windings, some climbs through chestnut woods, some rushes down steep slopes, when the machine seemed to drop under me—it's a curious sensation coasting on a motor faster up hill than you ever come down on an ordinary, and coasting down often faster than you want to; some villages were passed, and then I wound and zigzagged down from the mountains into Ventimiglia, and I was really in Italy. It was early, and Genoa might be reached that afternoon. A furious wind, a hot wind, was blowing from the south, but that didn't matter. It was only the dust, the ruts and the bumps I cared for, and they didn't matter much either. But after Bordighera the wind went down, the roads improved, and rapidly, easily running into San Remo, I passed the big hotels, the little park and came onto the *pavé*. I thought of stopping for coffee, when the people on the sidewalks shrieked, cabs fled into bystreets, I jumped for my life, for the motor crashed with the most awful crash I have ever heard. I found I was not hurt, and nothing seemed wrong with the machine. But when I wheeled it the motor screamed in agony. Done for. Two days of solid work in a shop instead of two days of lovely sunshine on the road, after a week of rain. And when we had made a new pinion, and put the whole thing together, we had to take it all apart again, and even after that it would only run about 10 miles an hour. And I was still at San Remo.

Next morning I took the first train to Pisa. From Pisa I managed to ride to Florence, I wanted to come up the Arno, and I slowly did it, at 10 or 12 miles an hour. It is a beautiful ride, once you get really into the country; first over the hills, with the mountains of Carrara and Lucca behind; then by Ponte d'Era and San Miniato, and Empoli, a dreary, swindling place; and on, through Monte Lupo, then Signia, and across the suspension bridge, and the Cascine into Florence. I had ridden about 900 miles, but I had smashed almost everything smashable. Still I finished the first stage, as I started it, on the machine.

But it would never do to come back at that funeral pace. The fine weather was over. I had something else to do, and the makers were good enough to send me another engine; I did not start back for weeks. This time, however, a straighter line could be followed and better speed made, for roads and weather should be more settled in mid-June than mid-March. From Florence to Pistoia all went well. The roads and people alone were vile. Why will workmen and farm hands in Italy curse and threaten you when on any sort of fast moving vehicle? I don't know if it is a hatred of progress, or a hatred of those they think are well to do. Anyway, it is a fact, and the hostility of the people was one of the reasons given by the Italian Government for refusing permission for the Nice-Abazzia race. As a rule, the Italian who travels by road is not nice. He is either fast asleep, or, if not, he only pretends to give you a foot or two to pass. If driving animals, he not infrequently deserts them, when he sees you coming, and you may get by as well as you can. If he doesn't actually set his dogs on you, he doesn't call them off; nor does he look after his children, unless you hurt them, when he is careful enough to get damages.

No one in Pistoia, and, least of all, the guide books, could tell me the best road of three or four to Bologna, so I took the shortest, and the steepest. Up it I went by the railway for 10 or 11 miles. I was hundreds of feet above the tunnels. I should have seen the wonderful view back if, when I got up a few kilometres, I hadn't run into a fog, and then struck a snow storm—in June—and then thunder and hail, and more fog and rain. So I put my head down, and went, and the next thing was the top. And then a romantic ravine, and then a great break in the hill at Poretta, and then rain, rain, and washouts, over one of which the machine had to be carried; and then by the road which follows the railway, and is finer than it looks, into Bologna, in an awful storm, passing under the great arcades that lead up to the chapel one sees from the railway. But neither the machine nor I was the worse for it, though it was rather more vile than coming out.

I had just left Bologna next morning when it commenced to pour again. And a few miles from Modena, down I came with a crash, and, bending the crank out of shape, I had to walk, and so lost hours. But I did see the town while I waited, and some day I am going back to Modena to have a good look at it. But this time I was motoring, and I got along over the flat roads to Parma, and then to Piacenza for breakfast, and to Alexandria, and Asti, and so to Turin. Then I found that I had made a run on my bicycle which the Duke of Abruzzi had failed to do on a big car. Save for the last parts the surface is fairly good. I went mostly so fast that I didn't have time to bother about the scenery, which was flat and smelt rather stale. Just before Turin, where you come in sight of the Alps, I broke a sparking plug, but changed it, and, avoiding the Turin show, I got in. I should have left it next morning, but the British accumulators I had took this opportunity to break down, and though I worked half a day at them I finally gave up and spent the rest of it hunting for new ones. As I meant to cross Mont Cenis the next day the machine must be in order.

I got everything properly adjusted, but I must say that the first 12 kilometres out of Turin are, for a light machine, about as bad as anything I know. You just bump, jump and crash from one hole to another, and as these holes are all hidden in the dust there is no use trying to avoid them. The road to Susa climbs slowly, passing dirty villages, open sewers in the middle of the street, passing towering castles on rocks and other picturesque material, which I got a glimpse of out of the corner of my eye. But with every throb of the engine I was getting more and more interested in that, for it was running slower and slower, and weaker and weaker. I pumped oil in it till it smoked; I gave it fresh gasoline and adjusted its strap, and at last got to Susa. I looked up the road which disappears in a rock gorge, and mounts in 11 miles nearly 6,000 feet, the gradient, I am told, being one in ten. I have crossed every one of the big passes on the Continent, from the Carpathians to the Pyrenees, and I can say from experience that the gradient of Mont Cenis, on the Italian side for the first 8 or 10 kilometres, is the steepest and the most continuous of any of them. There is not a single level spot on it, while the road is the most monotonous I have ever been over. Not only this, Turin is 785 feet up; Susa, 50 kilometres farther on, is 1,625; and the top of the pass, 18 kilometres, is 6,950 feet. A climb of 5,325 in about 11 miles is not to be ignored. Much has been said of the terrible passage of the Arlberg in the Paris-Vienna race. The actual climb is less than 2,000 feet, and it is rideable almost all the way on ordinary bicycles. My wife and I have done it in the course of a morning, and it is only now we learn that it is something for an automobile. But I admit Mont Cenis bothered me.

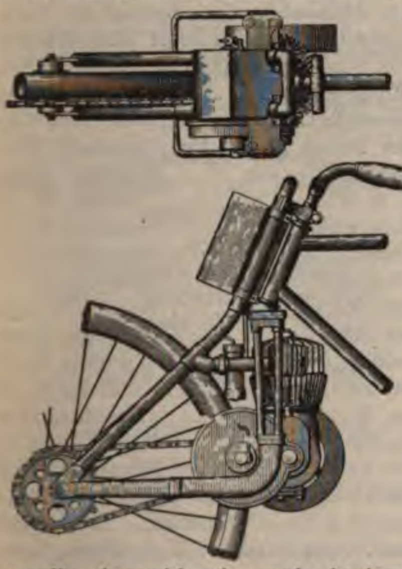
(To be continued.)

MOTOR VEHICLE PATENTS..

United States Patents.

709,445. Engine Support.—Albert W. Menus and Alberto T. Van Horn, of Malden, Mass. September 16, 1902. Filed January 22, 1902.

The engine is mounted below the head at the rear of the steering wheel to move



laterally therewith, the cycle having its forks of special shape adapted to receive the engine between them. As illustrated, the fork crown is of considerable width to secure the proper space between the forks. This crown receives near each end a substantially vertical double member of the forks, and consisting of pieces of tubing lying in a plane at the rear of the wheel. To the lower end of each pair of vertical members is secured a casting, formed with an arm extending in toward the wheel. To this arm is secured a horizontal member formed of oval tubing, lying parallel to the plane of the wheel and extending in opposite directions from the intermediate member. Its forward arm reaches to the desired distance in front of the head and terminates at its outer end in a fork end, which receives the axle of the front wheel, and the rear or inner portion or arm extends into proximity with the vertical portion of the forks, where it is fixed to projections from a supporting plate. Upon this plate the crank casing rests and is bolted thereto. To steady and further support the engine, it is secured at the top by a brace or arm bolted to the under side of the fork crown and having a projection extending into a recess in the cylinder and secured therein by a screw threaded through the projection into the cylinder.

709,549. Motor Attachment for Cycles. —L. M. Meyrick-Jones, of East Dereham, England. September 23, 1902. Filed September 20, 1901.

No. 709,549.

The motor is carried on a light frame, which can be slid backward or forward along and be secured at any desired point to longitudinal slide bars secured by clamps to the cycle frame. The frame carrying the motor is placed between two bicycles, which are side by side and at a distance apart from one another. The motor is mounted on a single transverse bar having clamps at its ends to embrace longitudinal guide bars. The ends of these guide bars are in turn held in clamps on short rods which by other clamps are secured to suitable members of the cycle frames, the clamps at each end of this attachment being capable of turning to any required angle relatively to each other. Other stay bars are similarly carried from the motor to the opposite ends of the cycle frames or as otherwise required. The motor is arranged to drive a transverse shaft, and pinions on the ends of this shaft gear with toothed wheels secured to the crank axle or driving wheels (either front wheel or back wheel) of the cycles.

709,597. Rotary Force Pump.—Samuel M. Frank, of San Antonio, Tex. September 23, 1902. Filed March 21, 1902.

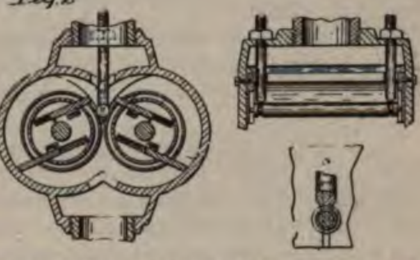
The pump has double revolving pistons with slidable spring controlled valves working through the pistons not diametrically opposite each other in the usual way, but the valves of each piston work parallel to each other and through the cylinders at points diagonally opposite.

The pump is operated by a pulley on one of the piston shafts, and motion is imparted from the latter to the other piston shaft by suitable gearing. The pump cylinders have an induction port below and an exhaust on top to a water chest.

Each piston is provided with a pair of slidable valves, working parallel with each other in pairs through the walls of the pistons at points diagonally opposite and controlled by spiral springs. Each valve is provided with a projection or pin to engage an angle stop plate for the purpose of limiting the outward movement of the valves under pressure of the springs. The stop plates have a slot, and they may be adjusted to vary the travel of the valves by set bolts passed through said slots.

Upon the inner side of each end wall of the pump is attached a V shaped valve shoe, against which one of the valves of each piston bears, while the other piston valves bear against the pump cylinders during the revolution of the pistons. Journaled in the valve shoes and working between them and between the pistons at the lower point of the valve shoes is a roller valve, having grooves in which collars of adjusting screw rods are loosely secured. The valve shoes have a groove to permit the journals of the valve roller to slide vertically, according to the movement of the rod nuts, and the valve roller is adjust-

Fig. 2



ed vertically, as desired, to vary its bearing on the pistons, or it is raised by the rods clear of the pistons after the pump is started.

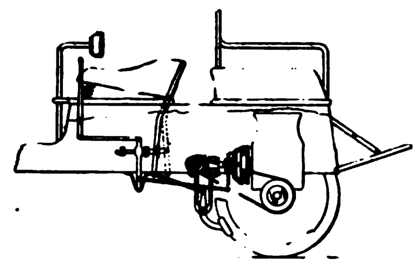
709,598. Electric Igniter for Explosive Engines.—Howard A. Gray, of Plainfield, Ill. September 23, 1902. Filed October 1, 1901.

The igniter is of the primary type and is controlled by the governor through the medium of the valve mechanism of the engine—as, for instance, the rod for operating the exhaust valve in an engine of the four cycle type or the rod or other device governing the feed valve in an engine of the two cycle type.

The electrodes consist of a cam rotating within the ignition chamber and a spring pressed rod extending into the ignition chamber, with the flat point of which the cam engages at a certain period of its revolution. The cam is fastened to a shaft driven from the crank shaft by bevel gears, and this shaft is made in two sections, connected by a ratchet clutch of such construction that, as one of the clutch members is shifted along its shaft section (by means of the governor), the other shaft section is given a slight rotary movement.

709,681. Safety Device for Motor Vehicles.—Andrew L. Riker, of New York, N. Y. September 23, 1902. Filed March 2, 1901.

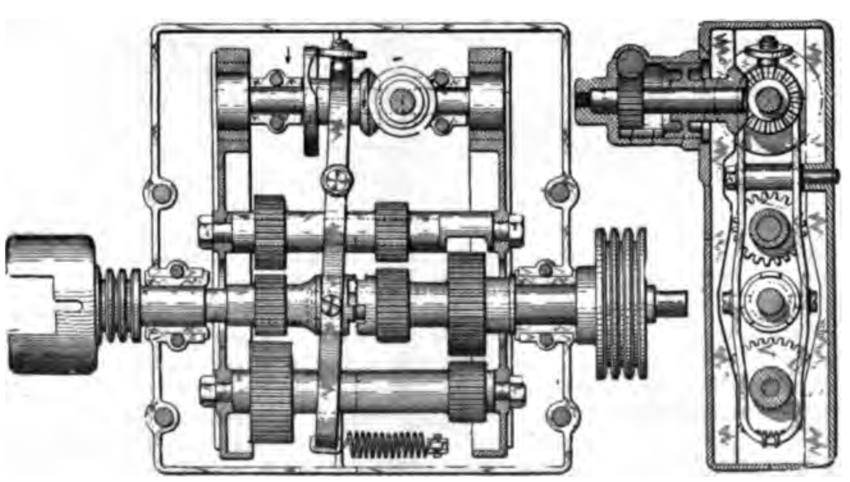
The device is actuated by the seat of the vehicle and is intended to stop a vehicle in case the driver should accidentally be thrown from his seat or in case the vehicle is started by anyone not in the seat. The motor is connected to the gearing by a friction clutch, and a system of levers is provided, by means of which the driver can



put the motor in and out of gear. The motion of one of the intermediate parts in this lever system is limited by two movable stops on a sliding rod connected by a lever to the hinged seat. Normally, when no one is seated in the vehicle, the seat is raised on the hinges by a coiled spring, and this puts the movable stops in such a position that the clutch cannot be engaged. In case the driver should be thrown from the seat the action of the spring would disengage the clutch.

709,690. Variable Speed and Reversing Gear.—Henry J. Westover, of Mount Vernon, N. J. September 23, 1902. Filed August 30, 1901.

The invention relates to a variable gear giving three speeds forward and one reverse, and in which the high speed connection is a direct driving connection. The gear comprises three parallel shafts, two of which—the low and the intermediate speed shafts—being journaled on a reciprocating slide and the high speed shaft being arranged between the low and intermediate speed shafts, but not on the reciprocating slide. The low and intermediate speed gears have fixed positions relative to each other and are moved positively into and out of mesh by the slide. For reciprocating the slide a shaft is provided having an eccentric at each end working in bearings in the slide, and beveled pinions are provided for rotating the shaft. The eccentrics are arranged so that when either the low or intermediate speed gears are in mesh the eccentrics will be on dead centres and will serve as a locking means to prevent the slide from shifting, and hence these two speed gears are positively locked when in driving connection with the motor or driving shaft—that is, one set is positively locked in mesh, while the other set is positively locked out of mesh. The high speed shaft is in two parts, which are disconnected and constitute the driving and driven members of the gear when operating at low or intermediate speed, and the two parts of this shaft are placed in operative connection by means of a jaw clutch, which is operated by a pivoted lever held under spring tension for throwing the clutch into engagement. The engagement and disengagement of the clutch is controlled by a cam wheel which rotates with the shaft through which the slide is reciprocated. The shape of the cam wheel is such that while shifting from the position of rest to low speed and from low speed to intermediate speed the clutch controlling the high speed connection is disengaged, and in shifting from the intermediate speed to the high speed the clutch is allowed to engage. The reversing mechanism comprises a set of friction gears for each end of the high speed shaft and an intermediate gear, such as beveled pinions, for changing the direction of rotation. The reversing shaft, which carries part of the friction wheels and the reversing pinions, is mounted in eccentric bearings provided with a rocker arm or lever, by means of which the reversing shaft is slightly raised or lowered, whereby the friction wheels are placed into or out of engagement. The friction wheels of the reversing gear are arranged so as to give a reduced speed at the driven end of the main or high speed shaft.



No. 709,690.

The Madison Square Garden Show.

EXHIBITORS.

Duryea Power Co............Reading, Pa.
Adams & McMurtry Co........New York
Centaur Motor Vehicle Co.........Buffalo
Webster Auto Mfg. Co.........New York
Hoffman Auto Co...............Cleveland
Prescott Auto Mfg. Co.........New York
Grout Bros.................Orange, Mass.
Conrad Motor Carriage Co........Buffalo
Haynes-Apperson Co.............Kokomo
Electric Vehicle Co..............Hartford
Automobile Co. of America...Marion, N. J.
Cleveland Automobile Co..Cleveland, Ohio
Eckhard Electric and Gasoline Motor Co.,
Vehicle Equipment Co....Brooklyn, N. Y.
U. S. Long Distance Auto Co...New York
Mobile Co. of America..Tarrytown, N. Y.
Foster Automobile Mfg. Co.Rochester, N. Y.
Peerless Mfg. Co.........Cleveland, Ohio
Ohio Automobile Co........Warren, Ohio
C. J. Moore Co..........Westfield, Mass.
Loomis Automobile Co...Westfield, Mass.
Meteor Engineering Co......Reading, Pa.
Automotor Co..........Springfield, Mass.
Olds Motor Works.........Detroit, Mich.
International Motor Car Co..Toledo, Ohio
Pan-American Motor Co.Mamaroneck, N. Y.
Knox Automobile Co...Springfield, Mass.
Autocar Co.................Ardmore, Pa.
White Sewing Machine Co.Cleveland, Ohio
Smith & Mabley..........New York City
Locomobile Co. of America.New York City
Baker Motor Vehicle Co..Cleveland, Ohio
Waltham Mfg. Co........Waltham, Mass.
Geo. N. Pierce Co..........Buffalo, N. Y.
Vehicle Equipment Co.....Brooklyn, N. Y.
Studebaker Bros. Mfg. Co.South Bend, Ind.
B. V. Covert & Co........Lockport, N. Y.
Upton Machine Co........New York City
Crest Mfg. Co..........Cambridge, Mass.
Spaulding Auto. & Motor Co..Buffalo, N. Y.
E. R. Thomas Motor Co....Buffalo, N. Y.
Thos. B. Jeffery Co........Kenosha, Wis.
Berg Automobile Co.......New York City
Ward Leonard Elec. Co...Bronxville, N. Y.
Winton Motor Carriage Co...Cleveland, O.
Automobile Co. of America.....New York
Pope-Robinson Co......Hyde Park, Mass.
Fournier-Searchmont Automobile Co.,
Philadelphia
J. Stevens Arms and Tool Co.,
Chicopee Falls, Mass.
Hartford Rubber Wks Co..Hartford, Conn.
Metallic Rubber Tire Co..New York City
Baldwin Chain Mfg. Co..Worcester, Mass.
Badger Brass Mfg. Co.....Kenosha, Wis.
Jos. Dixon Crucible Co..Jersey City, N. J.
B. F. Goodrich Co...........Akron, Ohio
Veeder Mfg. Co..........Hartford, Conn.
Rose Mfg. Co...........Philadelphia, Pa.
Gray & Davis...........Amesbury, Mass.
R. E. Dietz Co...........New York City
National Carbon Co.......Cleveland, Ohio
Atwood Mfg. Co........Amesbury, Mass.
Buffalo Gasolene Motor Co..Buffalo, N. Y.
Standard Welding Co.....Cleveland, Ohio
American Ball Bearing Co.Cleveland, Ohio
Whitney Mfg. Co.........Hartford, Conn.
Dow Portable Electric Co...Boston, Mass.
Chas. E. Miller...........New York City
Thos. J. Wetzel...........New York City
Diamond Rubber Co..........Akron, Ohio
New Process Raw Hide Co..Syracuse, N. Y.
Firestone Rubber Tire Co....Akron, Ohio
Jos. Dixon Crucible Co........Jersey City
B. F. Goodrich Co............Akron, Ohio
Post & Lister Co.,
Homan & Schultz.........New York City
Consolidated Rubber Tire Co...New York
A. H. Funke....................New York
C. F. Splitdorf...................New York
National Carbon Co........Cleveland, Ohio
Weston-Mott Co...
International Auto
Tire Co....

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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☞ One week's notice required for change of advertisements.

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The Policy of "The Horseless Age."

Occasionally we receive letters from advertisers expressing disapproval of the publication of certain reading matter in THE HORSELESS AGE on the ground that it is detrimental to their personal interests or those of the industry at large. As the policy of a journal is of vital importance to its readers as well as to the welfare of the cause it is intended to further, a few words in explanation of our policy will not be amiss.

In some quarters of the trade exception has been taken to the experience letters which are a regular and valuable feature of THE HORSELESS AGE. Objectors take the stand that only favorable experiences should be published; that every criticism and every fault should be carefully kept from the public eye, in order that ideals may not be rudely shattered and that no one may have a suspicion that the automobile of today is not an absolutely perfect machine.

It will be readily admitted by all intelligent minds that the future of motor traffic depends entirely upon the practical results achieved. Where such results are lacking no amount of talk or booming can long avail. This being the case, no better method of furthering the cause of the legitimate industry can be conceived than by the publication of the actual results obtained in practice and of the full details connected therewith, and where results have been unsatisfactory to point out the cause and suggest the remedy. It is by our failures, not by our successes, that we learn, and if the automobile industry is worthy of the attention of serious men it must be because the machine is capable of improvement. Improvement is not brought about by evasion and concealment of defects, but by a frank acknowledgment of them and a careful investigation of their causes. When in science or the arts the need of some great improvement or discovery becomes urgent, what is the method adopted for the accomplishment of the purpose? Is the fact kept secret and a foolish reticence observed about it lest it find its way outside the narrow circle which best knows the necessity of it? By no means. It is heralded far and wide, rewards are offered for the successful worker, in order that thought may everywhere be stimulated. If, then, it is the improvement of the automobile that is most to be desired, we must know what particular parts most need improvement, and to secure this we must have evidence, the actual experience of disinterested users of the machines. The dissemination of such experiences excites the inventive faculty of thousands, educates operators in the proper use and care of their machines, warns manufacturers of their own shortcomings, concentrates thought and in general brings into closer association manufacturer and user, whose co-operation in a new industry is so essential to its progress and to the retention of satisfactory relations between them.

No, the automobile industry can only be the gainer by the publication of the actual facts, the truth, the whole truth; nothing but harm can come from the withholding of facts or the falsification of them.

It is our aim in the pages of THE HORSELESS AGE to present the full, unbiased truth about automobiles and developments connected with the movement, to open our columns to every sincere inquirer and to every honest witness who has something instructive to impart.

Mistakes or misunderstandings are liable to occur, and for this reason we offer space in our columns to any reader who may wish to correct mistakes or who may take exception to views expressed editorially or by correspondents, provided, of course, it is his endeavor to courteously present an honest opinion.

Motoring is still a new subject. Discoveries are being made every day. Some of these "discoveries" are made in the shop, but probably many more come from use upon the road. Nearly every breakdown, each mishap on the road carries its lesson, and it is certainly to the advantage of both maker and user that information about breakdowns most liable to occur, the provisions that must be made against them and how repairs may be easiest effected should be brought to the notice of the largest circle of interested persons.

The Communications department, we have reason to know, has been much appreciated by our readers, mostly men who actually own or are about to purchase automobiles and who read an automobile

publication because they are anxious to learn the exact facts about automobiles, and to post themselves in the difficulties and dangers of operation as well as in the proper care of the machines.

Some of our readers have suggested that the names of machines should be given in letters of experience. This, we are convinced, would largely defeat our object, which is not to advertise or defame any machine or machines, but to give general information only. It is quite obvious that writers would not be so frank if the name of the machine were published, and that abuses would soon creep in.

Furthermore, let us state, we never give any personal advice, confidential or otherwise, regarding the purchase of cars. We cannot claim such intimate knowledge of the thousands of intending purchasers or the hundred or more of different makes now on the market as to be able to tell offhand which would be best in any particular case. And to make an investigation such as would be necessary in order to give a recommendation both fair to manufacturers and valuable to inquirers is something that cannot be done for the price of a subscription, and falls properly within the province of the consulting engineer.

Besides, it does not appear to us compatible with good judgment and fair dealing to solicit the advertising of all reputable manufacturers and then recommend the product of a particular one or of several. Publications which offer advice to prospective purchasers are usually the ones least competent in such matters, and it is probably not an exaggeration to say that the advice given is, as a rule, not worth the postage spent on it.

In other matters—matters of fact and not of opinion, or where purely mechanical questions are involved—we are always glad to furnish our readers any information at our command, and reply to all inquiries, either by mail or in our Communications column, as the subject may suggest.

Much pressure is brought to bear upon all trade publications, those devoted to a new industry especially, to puff advertisers, either personally or their goods. It is astonishing how flattered some people are to see a silly, inconsequential thing said about them in the reading columns of a paper that they would not take the least notice of if it were said about someone else. It does not matter to them whether the statement is based upon actual knowledge and conviction or is simple persiflage. "And I hope you will give me a good personal recommend," wrote a gentleman whom we had never had the pleasure of meeting, in fact, never had heard of before, when he entered the industry about a year ago. It is a rule to which there are only few exceptions—and we could mention a number of illustrations in the automobile business—that men who really accomplish things worth noting are unassuming and do not crave cheap notoriety.

Worse than the publication of trade puffs, which result simply in a waste of space and the degradation of a paper, is the suppression of unfavorable yet legitimate news, which is prompted by fear of offending the parties concerned and thus losing their advertising patronage. Such news may relate to the performance of vehicles in contests, business affairs, etc., information which is of great moment to the public, and to which they are rightly entitled. With THE HORSELESS AGE the selection of news and other matter is determined only by its interest and value to readers and without regard to whom it affects or whether it is favorable or unfavorable to individual interests.

THE HORSELESS AGE does not blindly uphold any cause labeled automobile. To it a crime committed with an automobile is no less a crime for that reason. Our position on legislative and speed questions is determined by the principles of justice and equity, and the ultimate good of the industry. Where the enforcement of reasonable speed rules might result in one automaniac turning his back upon automobilism, the storm of public indignation which would follow the unrestrained monopolization of the highways for speeding and racing purposes would cause a loss of 100 more desirable recruits to the movement. We are positive there is no organized opposition to the automobile by older vested interests and by the authorities, as is constantly hinted by some publications both here and abroad; the dangers that are threatening the movement are from within. The general public will accord the automobile its hearty welcome on condition that its rights upon the highway be respected. We are of the opinion that there need be no clash between the automobilist and other users of the road, and are in favor of reasonable legislation defining the rights and duties of both sides, and strict and impartial enforcement of the laws enacted.

Such questionable journalistic methods as we have referred to are, of course, most common in publications circulating among the less enlightened public. Our leading magazines, which appeal only to the well educated classes, do not indulge in such practices, but scrupulously exclude from their pages everything tainted with commercialism. The majority of automobile owners belong to these same classes, and only the highest aims in journalism will meet with the approval and support of the best automobile reading public. If the kind of journalism that caters to personal vanity or to the belief that the public must be kept in ignorance occasionally and temporarily succeeds, it is for the reason that gudgeons are not limited to the buying classes, but are also found among those who have things to sell and to advertise. This is most noticeable in the callow days of an industry, before the law of the survival of the fittest has winnowed the chaff, when brag and bluster are easily confounded with commercial ability and when social considerations are apt to be given undue weight in the conduct of business enterprises.

The Causes of Stops in the English Reliability Trials.

The list of causes of stops in these trials, published in our last issue, shows that only in very few cases were the mishaps so serious that they could not have been made good on the road by any fairly experienced driver, although the time consumed in making the repairs would undoubtedly have been considerably longer under ordinary conditions. Quite a number of stops are reported as having been due to "the driver accidentally stopping the engine." Every time an engine stopped and caused a delay it seems to have been the fault of the driver, to judge by this report. Opinions may differ as to how the fault was divided between the driver and the engine, but the fact that there were so many stoppages of engines for which no better cause could be assigned than unskillful handling of the control levers by the driver, proves that the latter must exercise extreme care in running his machine if he wants to avoid loss of marks from this cause.

The greatest number of stops were due to different defects in the ignition system. In several instances a number of marks

were lost by a stop to change accumulators. It appears that a spare set was carried along, but not connected up so it could be switched on without stopping the engines, which neglect seems inexcusable. Fouled spark plugs, although mentioned a few times, were not a frequent source of trouble, but, with derangements in the trembler, broken connections, cracked porcelains and deficiencies in the source of current supply, the aggregate number of stops due to ignition troubles was comparatively large.

More stops were due to defects in the cooling system than one would think need have occurred. This may be due to the fact that the water circulating system is considered of less importance than other portions of the car, and is, therefore, not given the same care in construction; and besides, it not infrequently happens that vehicles are finished on the very eve of the contest, so to speak, and in the general haste the circulating connections which are about the last thing to be placed on a car, are likely to be made in a slipshod manner. But some of the mishaps point to faulty design and insufficient provision for cooling. In one case, for instance, a large part of the water supply evaporated while the cars were required to stand in line at one place for an hour or more. It is claimed by the makers that the mishap which resulted (water giving out and engine running hot) would never have happened had the vehicles been kept running. This may be true, but in case a vehicle had to make its way for an hour or so through the dense traffic of a metropolis, would not the conditions be almost as bad as when standing? Greater cooling facilities would certainly be an improvement in this car.

Only a single case of stoppage due to trouble with the change gears is mentioned, but a number of keys shore off and pins dropped out, and the friction clutches slipped in a number of cases. Contrary to what happened in the New York-Rochester contest, the running gear seems to have given almost no trouble, but tire punctures and cuts and leaky valves were responsible for the deduction of many marks.

It is worthy of some attention that the only two American machines which had delays owing to weaknesses of certain parts were delayed by main driving chain troubles. The English cars also use chains, but there is not a single case recorded of any of these vehicles breaking or requiring to take up the chain. The English are proverbially fond of heavy construction, and perhaps this national characteristic has resulted in a more liberal dimensioning of the chains on English cars and avoidance of trouble from this source.

Some Advantages of the Automobile.

While we have not discovered any new points of superiority in automobile over horse and other traffic, it may be of interest to briefly summarize the chief advantages known to be offered by the new mode of locomotion, especially since these advantages seem not nearly so generally understood as they might be, and since the subject is of such importance that it will well bear repetition.

The general advantage of mechanical road locomotion, which will lead to its eventual complete or nearly complete substitution for horse traction, is that it constitutes a safer, cheaper, healthier and more expeditious and comfortable mode of travel. The various advantages of the automobile have not yet attained their climax, i. e., the automobile has not yet reached the height of its development, for although there has been remarkable progress in the seven years of the movement, anything like finality cannot be reached in such a comparatively short period. Yet, already the automobile has shown itself far superior to the horse vehicle for many uses.

Just at present the automobile is chiefly a pleasure vehicle. It is made in great profusion of styles and adapted to the requirements of users of widely varying means, ranging from the powerful, commodious and luxuriously equipped touring car, for the finest specimens of which prince and millionaire pay record prices, to the unpretentious, light weight runabout, the advantages of which everyone may enjoy who could afford to keep a horse and buggy.

Practically all users agree that as a vehicle for pleasure driving the automobile has no equal—its uniform, yet perfectly controllable motion, the sense of security experienced in driving it, the absence of worry about overworking a dumb animal and the independence, both as regards time and route, as compared with railway travel, give automobiling a charm of its own and constitute it a form of exhilaration that is greatly relished by all who know it by experience.

The sustained speed and comfort of touring cars has revived interest in country touring, which bids fair to again become extremely popular during the next few years. With horse vehicles country touring would be a hardship. Thirty to forty miles a day would be the limit of travel with a good team of horses, and at the end of the day's trip the tourists would be tired and worn out, while with the automobile twice this distance can easily be made in less actual running time and with less tiring effect upon driver and passengers.

For a number of practical purposes also the automobile carriage has already proved eminently suitable, notably as a doctor's carriage. Physicians whose practice extends over a large territory find that they can attend to their patients more promptly, take care of a larger practice, and find more time for reading and recreation by the use of the automobile. Not the least advantageous feature of automobiles for this work is that they can be left standing at the curb with the throttle locked or the electric circuits interrupted within a closed compartment, and the physician can attend to his patients for hours if need be, with perfect ease of mind.

The general introduction of the automobile in cities also carries with it numerous advantages to the general public. When the horse has become a rarity in city streets the wear of pavements will be enormously decreased, the dust nuisance will have been largely done away with, and it will be possible to keep the streets almost perfectly clean with very much less labor; the sanitary conditions of the cities will be improved and the noise and traffic lessened; owing to the greater speed and shorter length of the vehicles, there will be room for more traffic with less crowding, and finally, owing to the greatly superior control of motor vehicles, the streets will be safer for the pedestrian.

A service of automobiles for the conveyance of passengers and the transport of the mails is about to be started on the island of Corsica between Vico, Ajaccio, and Sartene.

To clean the porcelains of spark plugs emery paper is very frequently employed, but it has the disadvantage that it scratches the surface of the porcelain and the latter then collects and retains dirt much more easily. A better method is said to be to brush the end of the porcelain over with hydrochloric acid, which can be obtained at any drug store, and then wash it with water, which will restore it to its original white color.

A Home Made Generator and Pilot Light.

By W. P. Haines, M. D.

Many owners of steam carriages no doubt feel as I have felt regarding generators—that a successful one is of great advantage, while a poor one is of no advantage over the old fashioned torch and is positively dangerous.

I looked up several of the prevailing styles, saw several in operation which were owned by my friends, observed that one firm merely fitted a plumber's torch and called it a generator, and finally I decided I could devise a better one than I had seen, and at a small cost. The work is not difficult, and consists merely of a little pipe work and a little work making a sheet iron box. The essential parts are as follows:

4 Close brass nipples for 1/8 in. pipe..	$0.24
1 Brass union to fit a 1/8 inch pipe...	.20
2 Brass elbows to fit a 1/8 inch pipe..	.12
1 Pin valve to fit 1/8 inch pipe.......	.05

(The above can be obtained of the Locke Regulator Company, of Salem, Mass., and are listed on pages 16 and 17 of their catalogue of automobile parts—steam.)

One burner, complete, to fit No. 36 hot blast gasoline torch, made by the White Manufacturing Company, of 192 and 194 Michigan street, Chicago, Ill., shown on page 9 of Twentieth Century Catalogue, price $2.50, less 40 per cent., net $1.50.

One can Dixon's pipe compound or white lead.

One piece of heavy sheet iron, about 12 inches by 6 inches, 7 cents.

One piece light sheet iron, about 6 inches square, 5 cents.

One piece burner gauze, about 3 inches square, 5 cents.

One dozen small iron rivets, 5 cents.

Total, $2.33.

The tools required are: One pipe tap and die to cut thread for 1/8 inch pipe, one small Stilson wrench, one small monkey wrench, one vise firmly fastened to a bench, one brace and drill to cut hole to take 1/8 inch pipe, one small hacksaw, one centering punch, one riveting hammer and one pair of tin shears.

The principle involved is as follows:

In the gasoline system of the carriage, where the fuel passes from the boiler to the fuel valve of the burner, there is a long brass elbow, and in ordinary use when the fuel reaches this elbow it is in the form of vapor. Now, if the flame of a plumber's torch be directed against this elbow the gasoline contained therein will in a short time be converted into vapor.

In actual practice with my generator this takes about one minute with a good sized torch flame, and the torch which I use requires less than a minute to get it under way, so that we can have the main fire burning blue in about two minutes from the start—certainly as quickly as with most generators.

The first thing to do is to detach the burner and casing, when the above mentioned elbow can be readily seen. This is accomplished by removing with a screwdriver the four small machine screws which hold the burner in place. Now close the gasoline cut off valve on the left side of the carriage and remove the fuel regulator by unscrewing the two unions, one in the water pipe system and the other in the gasoline system, just above the fuel valve. Of course, after the regulator is removed the water will slowly run out of the boiler if it has not been emptied previously.

Now place the gasoline regulator in a vise, fuel end up, and with centre punch carefully mark the centre in the end of the straight pipe, thus:

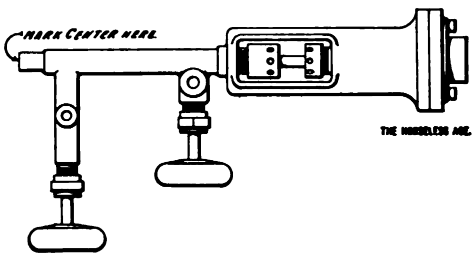


Fig. 1.

Now drill a hole straight into hollow of casting toward the diaphragm, and tap sufficiently to take a close nipple; smear the threads well with the pipe joint compound and screw in tightly. All the other joints should be treated in like manner with pipe joint compound. Next put on a union and screw up as close as possible, as the closer these parts are put together the neater will the finished appearance be. Next screw another close nipple on, then an elbow, and then the pin valve, taking care to leave the valve stem directed outward and forward, so that the valve can be readily adjusted, but do not turn it so far forward that its use will interfere with the main valve controlling the fuel supply to the burner. (See Fig. 3). Now screw another close nipple into the long end of the valve and fit an elbow to this. We are now ready to attach the torch burner, but it has to be shortened and the valve taken off (see 4 in Fig. 2). The expense of this might be saved when the burner is ordered, as the valve is of no use for this purpose, being too short. The end of the pipe of the burner (see 1, Fig. 2) should be sawed off, leaving only an inch projecting through the burner tube. If this is not done it will stand too high. The centre of the burner should be about on a level with the straight pipe of the regulator.

Before cutting the end off, the burner

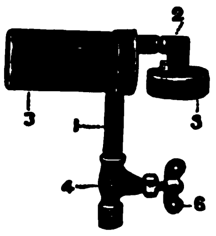


Fig. 2.

should be taken to pieces by unscrewing the back burner (2), when the cap of the burner tube may be slipped off and the burner tube (3) readily removed; the U shaped pipe should then be held in the vise, the end cut off by means of hacksaw, and the pipe threaded again by means of a pipe die. The burner parts may now be put together again, and screwed into the last elbow which was attached to the regulator.

Our heating device is now complete and it has only to be attached to the carriage, and the burner adjusted so as to direct the flame against the long brass elbow in the boiler before alluded to. This has to be done with the firebox and main burner off. The gasoline regulator and the new burner, which we shall now designate as generator, should resemble the drawing below (Fig. 3).

Next we have to make an opening in the firebox large enough to receive the generator, and in order to do this the main burner and inside casing with the asbestos lining must be removed. With tin shears cut a square opening straight down from the top of the burner casing large enough to allow the generator burner to enter, after which a narrow strip of sheet iron, about 1/2 inch wide, should be riveted across the top of the casing, as shown at A, Fig. 4.

Now attach the burner casing to the carriage, detach the generator from the regulator and attach the regulator to the carriage by means of its two unions; next attach the generator by means of its unions and observe if any changes require to be made in the square opening in the casing. If not the inside casing and asbestos may be put in place and the square opening marked and cut out.

Next the generator box must be made. Measure carefully the size square required to inclose the generator, its valve and perpendicular piping, and cut a strip of sheet iron large enough to form the four

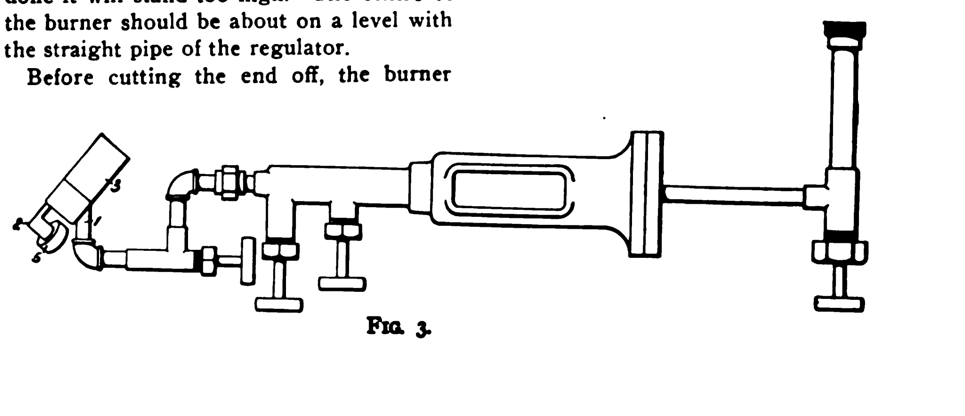


Fig. 3.

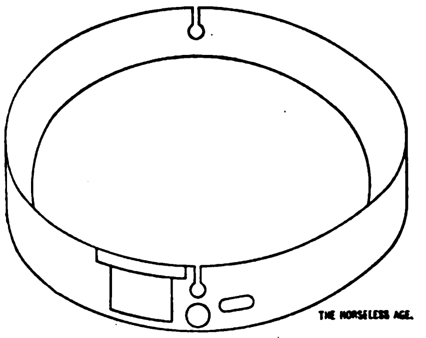


FIG. 4.

sides. In my own case I made a box about 3 inches square, and as the burner casing is 4 inches high this allows ½ inch at top and bottom for riveting. Of course, the length forward and backward may be greater, as there is nothing to interfere except the curve of the firebox.

Be sure to make the corners square, and it is better to lay it out and mark it with a square, for if this is not

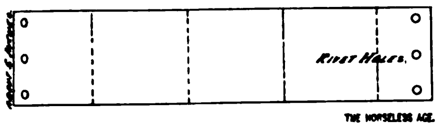


FIG. 5.

done accurately the job will not look neat and will cause trouble when the door is made. Lap joint and rivet the ends, thus forming a hollow square, and keep the slide down for the bottom. Next cut a slit in each corner ½ inch long on the side which goes next to the firebox and bend at right angles to form a rim. This gives plenty of room for riveting. Punch two holes in each rim.

Two openings must now be made in the side of the box which is to face forward,

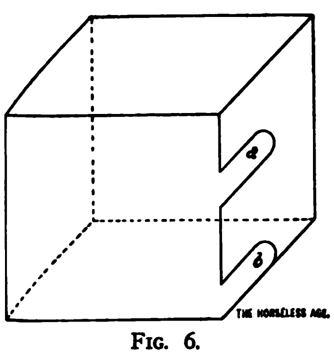


FIG. 6.

to permit the pipe extending from the regulator to pass in. This will come near the top, and another one lower down will be necessary for the generator valve to extend through (*a* and *b*, Fig. 6.) This is necessary, for if the generator box is made large enough to inclose the valve the latter will get too hot to handle. These openings must be carefully cut, for we do not wish any extra apertures on this side, on account of wind. Next rivet the generator box to the firebox and trim up any irregularities in the square opening of the firebox which may appear; then attach the firebox and burner to the carriage, detach the generator burner by unscrewing the union and place the regulator in position and fasten. Now attach the generator burner and the generator is ready for trial.

To fire up, open generator valve slightly, allowing a small quantity of gasoline to run down into drip cup 3 (Fig. 2); light and protect the carriage from the flame by a sheet of gauze or tin held over the generator box till the fire burns out. Then open the valve slowly, when a blue flame of intense heat will appear. See that it is directed against the brass elbow, and in about a minute try the main fire valve by opening it slightly and closing quickly. If the main burner does not give a blue flame, wait a little while longer and try again. When one gets a little accustomed to firing up with this attachment, steam can be obtained through the open safety valve in about two minutes. Very little air pressure is required, five or ten pounds being ample, and if the carriage is fitted with a steam air pump very little labor is required for the operation.

The automatic features of this generator are plainly apparent: When the main fuel valve is well open most of the gasoline vapor goes into the burner, the generator burning with a small flame only, while when the fire is shut down by the regulator the generator flame burns full and keeps steam up. A little practice will be found necessary to learn how much vapor to give the generator. In firing up in a hurry, when a little noise is of no consequence, the generator valve may be turned on full, but in ordinary use it should be regulated to burn without noise.

The door should now be made from a piece of light sheet iron. The edges should be turned and stand at right angles to the face of the door and close inside, constituting an edge to make the door fit tightly. The hinge is placed at the top, in order that the door when opened may extend outward, forming a protection to the woodwork of the carriage. When the gasoline in the drip cup is first lighted the door should be closed immediately after lighting, and if the edges fit snugly no device will be necessary to keep it closed.

A square hole must now be cut in the door and a piece of fine copper gauze, about 1½ inch square, fitted to give the generator burner air. This is very important, as the generator burner will not operate without oxygen and the opening provides a convenient means of observing the flame. Of course, the generator box and firebox casing must be removed when attaching the door, and this may be done before trying the arrangement, if one wishes; but I prefer to know a thing is going to work before I put too much time on it, so I tried mine first and made the door afterward; in fact, I operated the carriage for several days with no door at all, but simply fastened a piece of fly net-

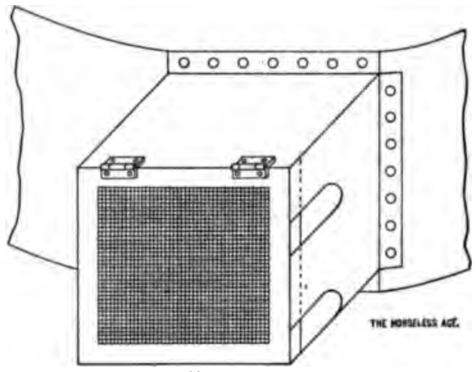


FIG. 7.

ting over the opening and held it in place by a piece of wire. The door is best hinged by two pair of small brass hinges, riveted in place.

When the generator and firebox are finally attached to the carriage, the space between the top of the generator and the woodwork of the carriage should be filled with asbestos, to prevent overheating the latter.

This arrangement has proved satisfactory in the use of my carriage; it will keep the carriage under steam indefinitely and consumes but a small quantity of gasoline. The union permits the generator burner to be removed readily. I believe the idea to be entirely original and that it does not infringe on any generator now on the market. I have never had occasion to use the detachable torch since attaching this arrangement, but if for any reason the generator should fail to work, due to clogging of the orifice, the torch may be used and the carriage fired up in the old fashioned way.

At the closing meeting of the British Association at Belfast a grant of £90 was made for research into the resistance of road vehicles to traction.

N. A. A. M. Matters.

At the meeting of the executive committee held September 30 it was decided to present a framed copy of the engraved standard warranty to such associate members as desired to use it, as well as to the active members. Practically all the active members have signified their intention to adopt the standard form. The following change of officers was made: H. Ward Leonard, formerly third vice president, elected first vice president; Frederic Martin Lande, formerly secretary, elected second vice president; Charles Clifton, elected third vice president; Windsor T. White, elected to executive committee; Harry Unwin, formerly assistant secretary, elected secretary.

The association is endeavoring to standardize the spacing and number of lugs for single tube tires and rim sections for double tube tires. It proposes to be of further benefit to manufacturers by bringing about the adoption of a standard for solid tires.

LESSONS OF THE ROAD

18,000 Miles in Three Years.

By Dr. Geo. P. Jessup.

"The proof of the pudding is in the eating." The value of the automobile depends on its practical utility in the hands of ordinary operators.

For three years I have used an automobile—or rather two automobiles—for all my professional work. For two and one-half years I have kept no horses. During that period I have been on the road nearly every day. There have been about five days when the snow was too deep to drive a wagon, and perhaps five others when neither of my wagons was fit for service. I have driven in the neighborhood of 18,000 miles, and, although I have had all sorts of breaks and delays, I find the automobile faster and safer than the horse and much more prompt in emergency service.

Necessity, a natural love of machinery and aptitude for mechanical manipulations have made me a fair mechanic. I am a firm believer in the future of the automobile (not the automobile of today), and feel that much can be done with even the imperfect machines now on the market. My machines are very early models of a well known make of gasoline cars, having been built in 1898 and 1899, and both being among the first 100 machines built by the firm. They have been altered, added to and repaired till at present they very little resemble the original product. They are a little slow on heavy grades and will not travel beyond an 18 mile gait, but run as smoothly (or, I should say, more smoothly) as when they were built, and I think I am safe in saying that road repairs and delays are no more frequent with me than with many operators of more modern cars. This is partly due to the very careful supervision which these wagons get, which enables me to detect and repair many small breaks and displacements which would in a few hours cause serious trouble.

I am sorry that most of our "lessons of the road" are written after a limited experience, seldom covering 3,000 miles, for I am sure they are misleading. It is my opinion, after having owned three cars and after watching closely the cars of my friends and neighbors, that a well built car should run for 3,000 miles almost without a mishap, except as to tires, and that after that mileage the wear and tear shows itself and its effects will develop at a constant rate for the normal life of the wagon, which, to judge from my own experience, should be about 25,000 miles. If this supposition be true, tables showing the cost of maintenance and repairs based upon the first few months' use of a new car must be faulty and misleading.

My repair bills are a little less now than at first, owing to the increased skill of my man and my own quickened perceptions. Some items are traceable to the desire to experiment and the necessity of correcting defective arrangements in the early wagons. These items would be less, but not entirely abolished, in using the more recent product. My repairs have been carried on largely in my own stable, which is heated and fitted with pit, anvil, vises and a complete outfit of such tools as are required for repair work, except, of course, the power machines found only in a regular machine shop. I keep a man, who has charge of the wagons and always accompanies me on the road to do any necessary repair work, make adjustments and start and look after the wagon. This man is not a mechanic, but has become more than an apprentice and can take down and set up an engine quicker than any man I have ever had from the automobile factory or other machine shops. He can fit new parts and make most necessary adjustments. The more delicate adjustments and most of the experimental work I attend to myself, as no one except an automobile expert can do this work, and these experts come high and only a few of them are any use.

From the very first I have kept a detailed account of my expenses. My mileage is estimated, but the estimate is based on a careful daily record kept for several months. I have never been able to make a cyclometer last more than 1,000 miles and gave them up after my first 3,000 miles.

It has cost me to drive about 18,000 miles, making no allowance for wages, water, rent, depreciation in value or interest on investment, $2,391.99, or about 13½ cents per mile. Adding the wages of my man and a fair allowance for rent of stable, heat and light gives nearly 21 cents per mile. This, I think, is the fairest basis for calculating the cost of operation, but if I add the depreciation in the value of my wagons and an item for interest I get 28 cents per mile. These figures no doubt seem extravagant to many users, but they are based on actual records which would fill several pages with details were I to give them. I have left out all items which came under the head of experimental work and have made no charge for my own time, as a large part of that has been spent in experimenting.

My figures include all the little items, such as express and car fare, which would not be considered unless actual accounts were kept, and show the cost of operating a 1,700 pound vehicle of rather ancient pattern during all sorts of weather, but always over macadam roads. These same macadam roads are, by the way, harder on tires than almost any other road surface, cutting them like a rasp. They are also much harder than country roads on running gear and engine, as there is a constant vibration which crystallizes and cuts bolts, springs and bearings. It is an acknowledged fact among horse users in our section that their tires, running gear and horseshoes wear out about 25 per cent. more rapidly than they did when we had dirt roads.

STATEMENT OF EXPENSES FROM NOVEMBER 24, 1899, TO SEPTEMBER 16, 1902, NEARLY THREE YEARS, ABOUT 18,000 MILES.

	18,000 Miles.	One Mile.
Gasoline	$204 80	.01137
Oil and supplies	110.10	.00611
Batteries (15 000 miles only)	174.44	.01160
Tires	592.41	.03291
		.06169
Repairs	1,310.24	.07279
		.13478
Wages (one man) 34 mo. @ $30	1,020.00	.05666
Stable rent, light and heat	300 00	.01666
		.20810
Depreciation in value (two wag.)	1,000 00	.05555
Interest on $2,000 @ 5 per cent	300.00	.01666
	$5,011.99	.28021

Gasoline used, 1,500 gallons.
Mileage per gallon gasoline, 12.

Taking up the individual items in my expense list, the gasoline used has been 76° naphtha and the first 3,000 miles of my experience was in a steam wagon, which used more gasoline than the explosive engines. Making allowance for this and substituting ordinary store gasoline for naphtha I think we may safely say that a machine weighing between 1,500 and 2,000 pounds can be operated at 1 cent a mile for gasoline. The gasoline must, of course, be bought in barrel lots and not at retail, a few gallons at a time. Under the head of oil and supplies I include cylinder and machine oil and cotton waste. As these articles have been purchased in bulk and at wholesale prices I consider my figures conservative. For ignition current I have used wet and almost every variety of dry batteries. Some of the batteries have been procured at special prices directly from the makers and some through an electric house where I buy quite largely and always get trade discounts. I have purchased batteries at one-third less than they can be had from automobile supply houses, and while the cost of batteries has been excessive I do not believe that it can at present be much reduced for wagons operated by make and break spark.

Tires at 3 29-100 cents per mile make an item which certainly is too large, but my tires have all been purchased at prices subject to trade discounts, and my experience with several different makes has been about the same.

Repairs make up more than half of the running expenses if we exclude wages and stable rent. My repairs have been done mostly in my own stable. I have employed men from repair shops, expert mechanics from machine shops, and mechanics at 25 cents per hour. Some of my bills have been excessive, but most of them pretty fair, and as much of the work has been done under my own eye, I have

not paid for much time not put in. At first many repair bills were caused by my lack of exact knowledge of the difficulty, but of late only bad breaks, when parts have been partly or wholly destroyed, have called for outside help. One broken crank shaft cost me nearly $75 because the new one had to be patched and fitted, as it was intended for a wagon of later model. Another broken crank shaft cost me $25, which I think you will agree is reasonable. Gears, new axles, bearings, chains and other parts all have their fixed price, and when broken must be replaced. My breaks have included nearly every portion of the engine and running gear, and only once were due to an accident, when I ran into a trolley car, wrecking the rear wheels of my car and (much to my satisfaction) pretty well demolishing the fender of the trolley car. On the more modern cars the breakage is, no doubt, less, but things will wear out and the great bulk of these cars have not reached the wearing stage.

With an old machine there are more petty delays and annoying mishaps in adjustment, but I doubt if many of the new cars will run 18,000 miles with much smaller repair bills. A lighter car will, no doubt, cost much less for repairs, but the expense for repairs with some of the high speed touring cars must be large.

The other items in my list speak for themselves, and I think are at least fair to the automobile. I started my expense account three years ago, hoping to show by actual figures how much cheaper it was to drive an automobile than a horse. I have given the auto every chance, but, on the other hand, have not failed to charge it with every expense incurred. The result, while at first quite appalling to the prospective user of the motor vehicle, is somewhat relieved by close inspection. Before buying my motor carriages I estimated (and I find the estimate usually below the reality in such cases) that my horses and stable were costing me about 25 cents per mile of actual service. I find that my stable expenses were no larger than those of most of my friends and colleagues. One busy and very practical man estimates his stable expense at $1,500 per year, and others range from $600 up, but none have actual figures to show. With an increased speed the cost of horse traffic increases very rapidly. A good horse may cover 20 miles a day almost constantly at, say, 6 miles per hour, but at 9 miles per hour he will scarcely average 10 miles per day, unless we are willing to use him up in a few months. At 12 or 15 miles per hour (the rate of a very slow or old auto) the horse would last only a very short time, and then must be of exceptionally good quality and consequently high price.

I have gone at some length into the question of cost of operation, because it is one of the first questions asked by all prospective users and a matter of vital importance to many actual drivers. It has been my intention to give to others the benefit of my experience, and I will now take up the various portions of the car and its accessories separately and give some of my experiences, and, if I may be allowed, my opinions as to how they should be constructed and handled.

To begin with the engine, the vital (and by too many considered to be the only essential) part of a good wagon. I believe that we have on the market a large number of engines which are in every way suited to the work demanded of them. Whether the engine of the future shall have one, two or four cylinders is still an open question. That it shall have mechanically operated accessible valves and be built with as few parts as possible (in fact, be comprised as much as practicable in a single casting) seem well established points. A medium rather than a very high or very low speed engine seems desirable; whether horizontal or vertical is immaterial, but I believe the best practice is tending toward the placing of the engine in front and leaving parts accessible and visible as much as possible. The jump spark seems to be in the lead at present, and, while I have never used it, it seems to me superior to the contact spark. Whatever form of ignition is used must be variable, and the near future will demand of all makers some form of ignition dynamo or mechanical igniter. Improved motors will no doubt be more flexible and will be provided with more satisfactory starting devices. I see no reason why the engine should not be started from the seat by some simple mechanism. Provision should be made for taking up the wear in all bearings, or for the easy substitution of new bushings, and all bearings must be ample and securely anchored to the main casting of the engine. I am of the opinion that many engines will return to the plan of gravity circulation of the cooling water, as the pump makes an extra part, which must give some trouble and does not seem to me necessary. My wagons are cooled by gravity circulated water and have never given trouble from overheating, unless something happened to my tank, letting the water out.

My engine has given me less trouble than any other part of the car. If properly fed with gasoline and electricity it runs smoothly and willingly. The exhaust valve is so placed as to be inaccessible without taking the engine completely apart, and has many times made me wish that the inventor could be made to replace my broken springs and grind the valve when necessary. This inaccessibility of valves is the worst feature in the engine.

The carburetor, although clumsy, works, and my efforts to substitute for it a smaller and more easily adjusted arrangement have not been successful. The carburetor insists on getting out of line with the inlet valve, but this trouble does not exist, or should not exist, in modern engines. The pistons work smoothly and are tight. One wagon has required new piston rings; one wagon has worn its wrist pin so as to produce a decided knock, and this must be rebushed as soon as I can replace a broken spring in the other wagon.

The sparking device is a little crude and sparking rods and levers occasionally break, owing to crystallization from the vibration of the engine, combined with that of the macadam roads. With all its faults the engine is willing and faithful, and, as I said before, the most perfect part of my wagon.

The transmission gear is one of the problems of the gasoline wagon. Shifting gear and individual clutch systems all have their faults. No doubt both systems have been greatly improved during the past three years, and it is an open question which will win out.

My wagon is dependent on individual clutches with two speeds ahead and reverse. I often wish for a third intermediate speed, and when my clutch fails to hold at a critical moment swear that I believe in shifting gears. Still, like the rest of the wagon, it works and is not the seat of as much wear as I expected. In fact, I have replaced only three gears in the transmission, and the remaining ones show very little wear. Clutch dogs and nuts have been replaced, but the change was made necessary because of bending, due to too tight adjustment. I am inclined to favor a separate lever for each adjustment, as I think they cause less confusion than where a single lever has several functions.

Whether we shall have two chains, one chain or no chain is still unsettled. I am inclined to favor the bevel gear drive, as capable of more perfect adjustment and because it is more easily protected from dust and is much cleaner. Theoretically it is less efficient than a good chain, but a perfect chain is something we very seldom have and a clean chain is something we almost never have. I have worn out three chains and have two more about half used up. My engine drives to an intermediate rear axle connected with the differential gear frame by spur gear. This spur gear has given constant trouble and has not been used on wagons built since 1900. The live rear axle seems to be gaining in favor. A hollow axle with inside bar holding the wheels in place, as described in a recent issue of THE HORSELESS AGE, seems to me the best arrangement.

Brakes must be efficient and one set must bear directly on the wheels or hubs. At first I had great trouble with my brakes. Shoes wore out very rapidly and adjustments were continually necessary, but as I have gained skill as a driver I use my brakes only occasionally, and there is very little wear on them. I believe the too free use of brakes is the cause not

only of unnecessary wear, but of uncalled for strains upon running gear and tires.

The running gear is, I believe, the most imperfect part of the old wagons and is still far from perfect in the newer ones. Whether the frame shall be wood, angle steel, tubular steel or steel and wood makes little difference, provided it is sufficiently firm and has the needed flexibility. Reaches are fast being abolished, and it is well. I find that I must have my reaches removed, plugged and redrilled about every six months unless I want my wagon to rattle worse than an empty hay wagon.

I am of the opinion that ball and roller bearings will come into favor again, although at present they are less used than they were a few years ago. They will be more ample than in the past, capable of more accurate and easy adjustment and will be accessible for the replacement of damaged parts. At present to replace the ball races in my front wheels requires the disassembling of the wheels with the removal of every spoke. As these races have had to be renewed several times it has been a matter of considerable inconvenience to me. There is no adjustment for the roller bearings in the rear, and I have recently been obliged to put in new axle tubes and yoke, a matter of some $15 and nearly two days' work.

The steering knuckles are subject to very severe strains and must be made heavier than has been the custom. I have broken several, but fortunately so far have had no serious accident. The steering apparatus will undoubtedly be of the wheel variety for heavy vehicles, but for light runabouts the side lever or tiller seems more convenient. All joints in distance rods and gear should be capable of adjustment for wear, as the slightest play makes steering difficult and often dangerous, besides producing unnecessary noise. I have twice had to have my steering gear taken apart and all holes plugged and redrilled.

I have had wire wheels on three wagons and in all the wheels gave no trouble for nearly 3,000 miles, but when the spokes once began to break they kept right on going at the rate of from five to thirty each month.

As to tires, there is little to say. In my opinion the double tube clincher is the best thing on the market. My wagons take single tube tires, and I have tried light tires and heavy tires with always unsatisfactory results. At present I am preparing to try a leather tread or cover which has just been placed on the market. It will not pay to repair single tube tires when once punctured, and new treads vulcanized on old tires are never very satisfactory. Three cents per mile for tires is almost a prohibitive price for a business wagon, and still pneumatics seem the only satisfactory tires for small wheels when driven at any but very moderate speeds. The leather armor may help. I have no doubt that tires will become more reasonable in price and better in construction, and a reduction in the weight of the cars will do much to reduce the cost of tires and to lengthen their life.

It does not seem right to pay more for electricity than for gasoline, and some form of spark generator will, no doubt, form an integral part of the coming car. At present users of dynamos do not seem as enthusiastic as they should be, and probably their dynamos are not perfectly satisfactory. If batteries are to be used, some form of dry battery seems to be essential to comfort and cleanliness. The wet cell and an automobile are incompatible. As to cells, the best I have found is a 7x3 inches round cell. Six of these cells will drive from 300 to 400 miles, and are better and cheaper than the so called compound battery which, if it gives out, is absolutely hopeless, as you cannot get at the various cell connections. I carry two sets, as I have several times been left uncomfortably on the road when carrying only one. They are packed close, in a tight box, under my front seat. The wiring is carefully done and wires exposed to oil are renewed from time to time. I find a knife switch much more satisfactory than any form of snap switch. I use electric light cord for wiring and pieces of heavy brass wire soldered to the cord, so as to make a long joint for terminals. The two wires overlap for at least an inch and are wrapped together beyond the solder, so as to prevent breaking at the joint.

My ideas as to bodies I will refrain from expressing, for I fear they would sound fanciful and absurd to most people, besides being a little vague as to detail. Suffice it to say that I believe the tendency will be to leave working parts, tanks, etc., uncovered, and that the coming automobile will have a form distinctly its own, differing as widely from the horse drawn vehicle as the locomotive does from the stage coach. Some form of canopy top will probably take the place of the hood and will be found on most business and many pleasure vehicles. My wagons have been changed by the addition of a box and collapsible seat in front and very much improved in appearance, besides being rendered much more convenient. This spring, with a coat of red paint, one of them passed everywhere as a new car, and there were many inquiries as to speed, etc.

I am enthusiastically in favor of the automobile and never expect to own another horse; but there are a good many hard and knotty problems still to be settled. The craze for heavy and fast touring wagons has led our inventors and builders to produce models that are of little use for business purposes. I hope before many years to have a light, low car, with 28 inch or 30 inch wheels, somewhat reduced tread, but sufficiently long wheel base, a rigid yet light frame, an engine easily started from the seat and instantly accessible in all its parts, a quiet and flexible transmission, easy springs and good upholstery, but not much body. This car must be capable of making from 4 to 20 miles an hour, of climbing a 20 per cent. grade and a 12 per cent. grade at a 10 mile speed; the whole should weigh not over 800 pounds and cost about $600. This dream may seem Utopian, but I believe is quite within the range of possibilities, even as to weight and price.

Minneapolis Races.

There was a large attendance at the automobile races at the Minnehaha Driving Park, Minneapolis, on October 1.

Mrs. W. Gardner secured the ladies' prize for the best exhibition of driving an auto, and Thomas Shevlin secured the gentlemen's. The prizes were lap robes.

Dr. W. A. Jones carried off the prize for the best appointed and most attractive machine.

George Dorr won the 5 mile pursuit race; Claude Lackey was second, and Ralph Bagley third. The machines were all 8 horse power or under 5, and were place 1/8 mile apart. The prize was $25. Time, 12m. 44s.

There were twelve entries in the 5 mile motor cycle race. John Nilsson was first, Thomas Bird second and H. T. Bascom third. The prizes were $15, $7.50 and $4. Time, 9m.

The 2 mile dash W. E. Wheeler won with a Cleveland, but the decision was protested and the judges withheld their decision until an expert shall have tested the horse power of the machine used by Mr. Wheeler. Time, 4m. 15s.

There were three entries in the 2 mile 8 horse power or under race. George Dorr was first, W. E. Wheeler second and William A. Sorg third. Time, 5m. 2s. W. E. Wheeler was not allowed to compete in class 11, the 1 mile race, it being claimed that his machine was more than 4½ horse power. Claude Lackey won. Time, 2m. 30s.

There were two entries to the 5 mile dash. The contestants were H. E. Dickenson and H. E. Wilcox, both using 15 horse power Wintons. It was by far the most closely contested and interesting event, as both machines were very evenly matched. Wilcox finally won out. Time, 10m. 42s.

Darkness seriously interfered with the 3 mile motor cycle dash. Victor Stromberg was first, O. H. Johnson second, George Dorr third and W. H. Haynes fourth. Two or three events were omitted on account of darkness.

According to the returns of the French Treasury Department, in 1901 a Government tax was paid in France on 5,386 automobiles, of which 1,149 were owned in Paris. The total amount of the taxes paid was $84,209, or at the rate of $15.63 per vehicle.

BEGINNERS PAGE.

The Fuel Feed, Vaporizing and Control System.

In the article on burners it was explained that in gasoline burners the gasoline is injected into a mixer tube at the side of the burner. In the present article we shall deal with the system of the pressure by which the gasoline is forced to the burner, the arrangements for vaporizing the gasoline, both at the start and under normal working conditions, and the devices by which the flow of the gasoline to the burner is regulated, both automatically and manually.

In all gasoline burners the gasoline is fed under air pressure of from 30 to 50

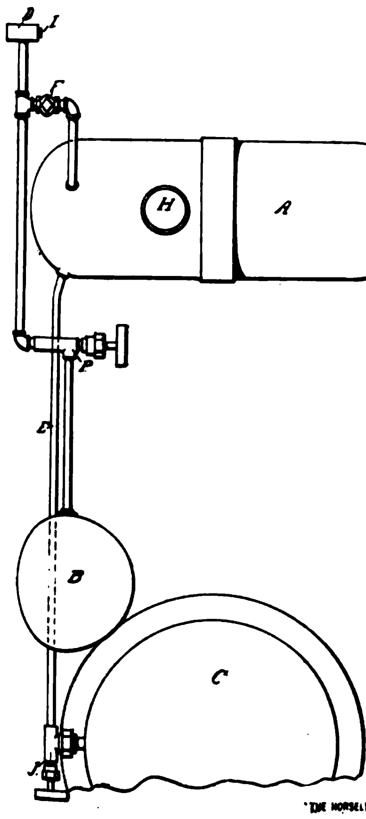
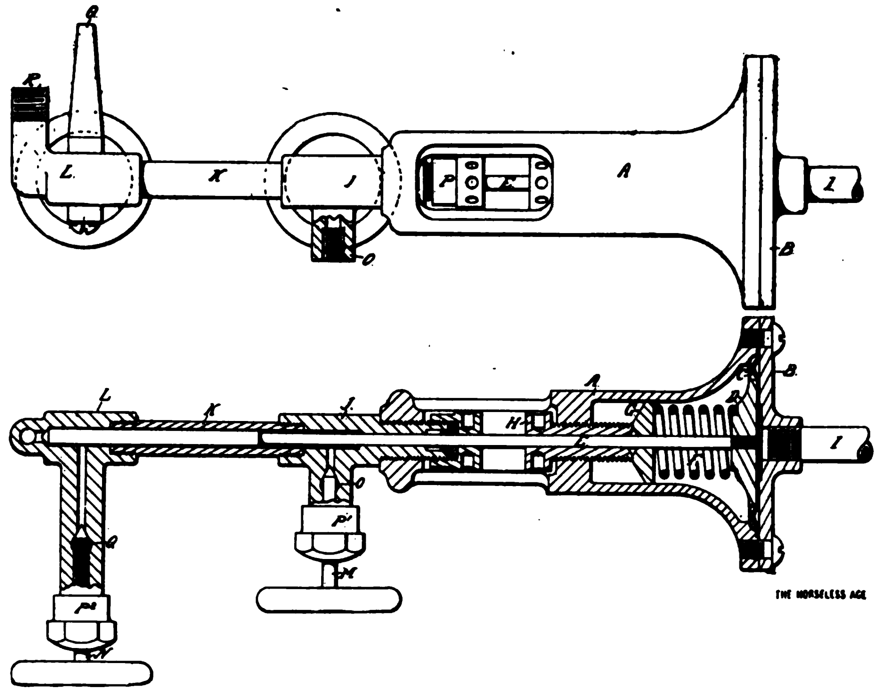


FIG. 1.—THE FUEL PRESSURE SYSTEM.

pounds to the square inch. Fig. 1 shows a typical arrangement for maintaining an air pressure on the gasoline in the supply tank. In this figure A is the gasoline supply tank, B an air tank and C the boiler. D is a pressure gauge usually attached to the dashboard of the vehicle, and E the gasoline pipe leading from the supply tank to the vaporizing pipes located over the burner. The supply tank A, the air tank B and the pressure gauge D are in communication with each other by pipes, in which there are two valves, F and G. When the tank A is to be filled with gasoline through the opening H, one of these valves must be closed to prevent the escape of the



FIGS. 2 AND 3.—PLAN AND SECTIONAL ELEVATION OF AUTOMATIC FUEL REGULATOR.

compressed air from the tank B. At the end of the pipe E is a valve by which the gasoline can be shut off from the vaporizer.

In the earlier carriages the only means for pumping up air pressure was a bicycle pump, the delivery tube of which was screwed to a threaded boss I on the air pressure gauge. At present a pump operated by the engine is practically always provided, and sometimes also an independent steam pump for pumping air pressure, the object being to minimize the trouble of hand pumping. These pumps will be described later on, and it will suffice here to state that the pump communicates with the air tank through a valve, which can be closed if it is desired.

THE AUTOMATIC FUEL REGULATOR.

After the gasoline has passed through the vaporizing pipes (to be described later), it passes through the automatic fuel regulator. A sectional view and an outside view at right angles to the sectional view of a representative device of this kind are shown in Figs. 2 and 3. The device consists of a body casting A with flared head, to which is bolted a head plate B. Between the body and the head is clamped a sheet steel diaphragm C, with a circular corrugation near its outer edge to admit of a considerable motion of the central part of the diaphragm. Against the diaphragm rests a metal block D screwed to the end of the valve stem E, the block being forcibly pressed against the diaphragm by the strong helical spring F. The opposite end of this spring rests against the spring plate G arranged slidably within the body casting A, and the pressure of the spring may be adjusted by means of the hollow adjusting screw H, which passes through a wall in the casing. A pipe I communicating with the water space of the boiler is screwed centrally into the head plate and the boiler pressure is thus applied to the diaphragm and opposes the pressure of the spring F.

At the narrow end of the valve casting A is screwed into it a T shaped fitting J; into this, the long nipple K, and to the latter the fitting L. The valve stem E extends through the various fittings to near the end of the fitting L, where it has its valve seat. The bearing part of the valve is made with a small cut in its face, so that when the valve is down on its seat communication is not entirely shut off. The arms of the two Ts J and L extending laterally from the axis of the instrument contain needle valves M and N respectively, the valve M controlling communication from the central passage of the device to the tapped boss O and the valve N from the central passage to the nozzle Q. All the valve stems pass through stuffing boxes, the caps of which are indicated by P, P' and P".

Normally the spring pressure against the diaphragm is stronger than the boiler pressure against its opposite face, and the valve E is held full open. Then the gasoline, which arrives at R from the vaporizing coil, passes into the space around the valve stem E and out either to the nozzle Q or the threaded boss O, according to whether the valve N or M is open. It flows through the nozzle when the burner is in regular operation and through the threaded boss when the burner is being started, the reason for which will be explained presently.

Now let it be supposed that no steam is being used and that in consequence the pressure rises rapidly. Then a point is soon reached when the boiler pressure on the diaphragm C is superior to the spring pressure, when the diaphragm will be forced inward against the pressure of the spring and the valve E be closed. Then the fuel

feed is reduced to the very small amount which passes through the saw cut in the seating part of the valve, which is just enough to keep the fire burning.

Other automatic regulating valves differ from this one, in that they shut off the fuel feed absolutely when acting and that they deliver only into the nozzle Q and do not have the valve M and outlet O.

THE TORCH.

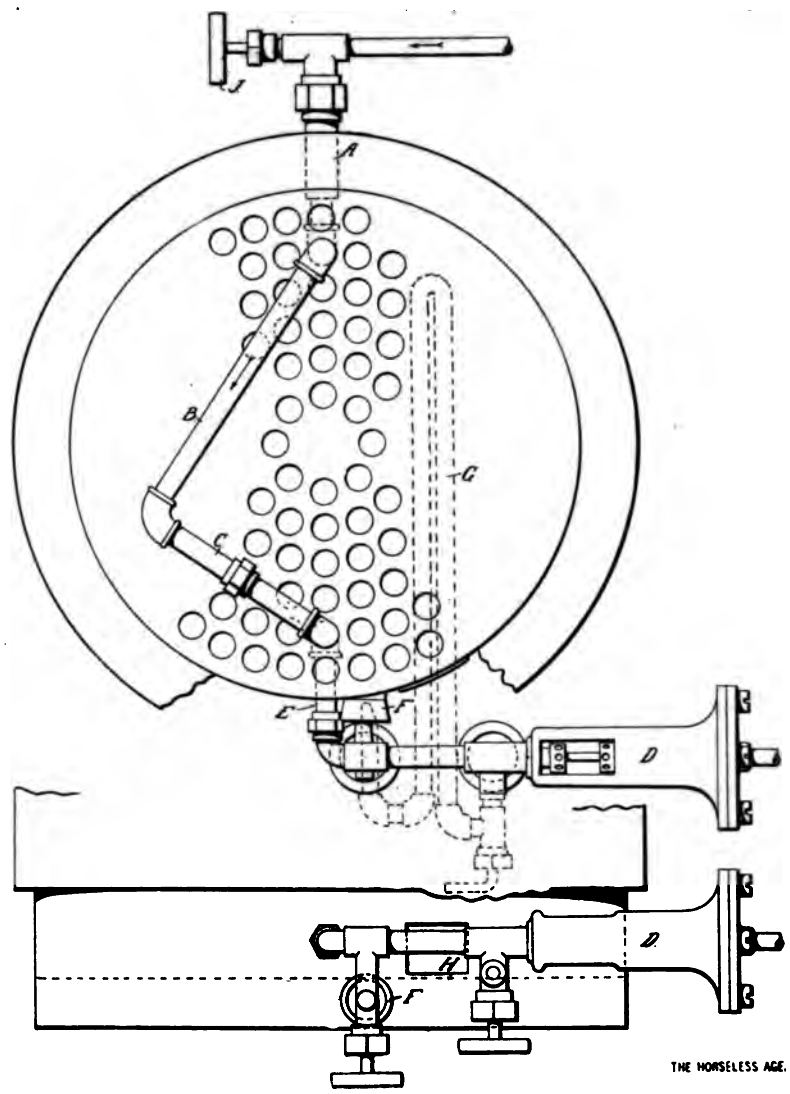
In normal operation the gasoline issues from the nozzle Q (Fig. 2) in the form of vapor, owing to the heat imparted to it in vaporizing tubes which pass through the boiler or over the burner. But when the burner is being started there is no heat in the boiler and no flame at the burner, and hence for starting some auxiliary vaporizing means must be provided, or else the gasoline would be injected into the mixing tube in liquid form. This auxiliary vaporizing means in certain steam carriages takes the form shown in Fig. 4, being referred to as a torch.

Referring to the figure, the torch consists of an iron tube A bent double. One end of this tube connects through two L's and a nipple to a nozzle B, and the other end through an L to the T-fitting C. Through this part C extends a rod D, which is threaded at two portions of its length, where it projects from the T-fitting, is drilled centrally from one end and has its other end turned at right angles, to turn it around its axis by. The drill hole in the centre of the rod is in communication with the tube A through a sleeve E over the rod, and the joints are packed as shown to prevent leakage. When the rod E is turned around its centre it progresses through the fitting C and can be screwed into the automatic fuel regulator (at O, Fig. 2). The nozzle B then extends into the mixing tube of the burner.

The torch is entirely separate from the burner. When it is desired to start the burner the tube A of the torch is heated in a stove or by means of some special heater to a dull red heat, and the torch is then connected to the fuel system as shown in Fig. 5.

Figs. 5 and 6 represent the fuel vaporizing and regulating and burner starting system as employed in several of the earlier steam carriages. At the top of Fig. 5 is seen the valve J, already referred to in connection with Fig. 1, by which the flow of fuel from the supply tank is shut off. The gasoline passes this valve and then through a pipe A into the burner casing between the burner and the boiler, then up one boiler flue, across the boiler on the top through the pipes B and C, down another flue and out through the boiler casing to the automatic regulator D, through the pipe E. From the automatic regulator the gasoline flows directly through the vapor nozzle into the mixing tube F when the burner is in full operation, and through the torch G when the burner is being started. The torch is shown in position in dotted lines in Fig. 5. There is a square opening, H, in the side of the burner into which the torch is passed.

In nearly all the later steam ca the vaporizing pipes do not pass t the boiler, but simply back and for the burner.



Figs. 5 and 6.—Plan and Elevation of Fuel Vaporizing and Control Sys

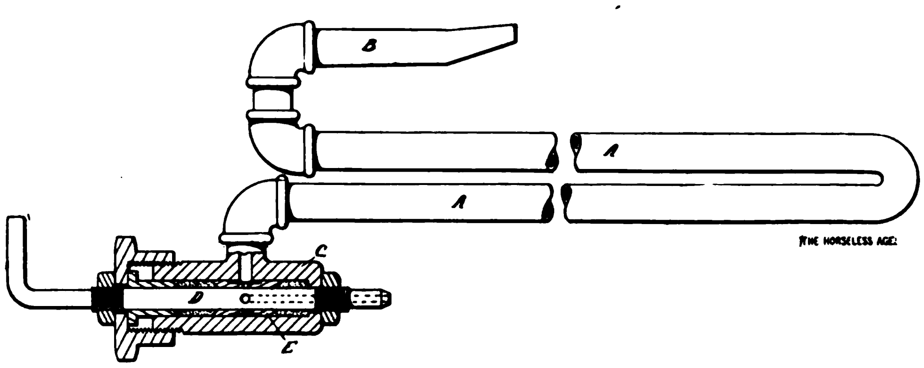


Fig. 4.—The Torch.

New Aluminum Alloys.

A new class of aluminum allo been patented by an Austrian invent makes the claim that, although th loys are not specially light, they h exceptionally high tenacity. He has that metals of the iron group when with aluminum in the proportion atomic weight of the latter to two weights of the former form alloys, in contrast to the usual rules regard properties of alloys, have a higher point than either of the components, not suffer in strength if heated to re Among the most practical examp such alloys are the following: Ni_2Al and $(Ni_{20}Fe_2)Al_{11} = Ni_{20}Al_{10} + Fe_2A$ alloy corresponding to the last formula is said to be excellent for t struction of metal cutting tools, and mit much higher cutting speeds th practicable with steel tools.

COMMUNICATIONS

One Summer's Touring Experience.

New York, October 3.

Editor Horseless Age:

Having read with a great deal of interest the letters by different users of autos, permit me to give you a brief account of my touring experience this summer.

When the automobile fever became serious with me, I looked around for some information on the subject, and The Horseless Age, of which I am a subscriber since June, 1900, furnished me a good deal, and was the means of my choosing intelligently a vehicle suited for my use.

After having looked at different makes, my attention was drawn to a well known gasoline machine. After looking it over for ten minutes a deposit was paid, and I was informed that my request to be allowed to come to the factory and be instructed in the minutest details and manipulation of the machine would be gladly and willingly acceded to by the company. Four weeks later I received word to come to the factory for my machine, and the company carried out their part of the contract to the letter and treated me with great courtesy. On April 28 last I left the factory in the morning and reached Bridgeport, Conn., the same evening, where I stopped for the night. The next morning at 10 o'clock I was on the road, and arrived in New York about 5 o'clock, without any mishap whatever.

During the next few weeks several short trips were made around New York. When Decoration Day and the Reliability Run to Westport came, I invited a young man of my acquaintance to an auto ride (intending to go to New Rochelle and see the contesting vehicles pass and return home), telling my wife to be ready to go out with me about 11 o'clock. I have since learned not to make any promises when going in an auto. We had barely passed Bartow, when B 29 passed. The young man with us thought he couldn't swallow the dust, so the throttle was opened up, and we followed B 29 for a while, and then overtook it. Ours was the first vehicle through Stamford, where the police patroled the streets to keep the people back. Our sporting blood was now boiling over, and when I drew up alongside the road to oil up, we were within a few miles of Westport. We started on the home trip at half past 11 o'clock. Everything went well until, a few miles out of New Rochelle, the machine stopped suddenly. The spark plug being O. K., I looked into my gasoline tank. Empty! The young man borrowed a bicycle from the sidewalk committee, and in two hours returned with a supply of that precious fluid. The machine was started again, and we arrived home at 6 o'clock p. m. What my wife said will remain untold. No more empty gasoline tanks for me after this experience!

In the middle of June my wife and myself started on a trip one morning and reached Branford, Conn., about 5 o'clock in the afternoon. While running along a level dirt road close to a farm house, both front wheels turned inward, stopping the vehicle so suddenly that my wife was thrown over the dash, but was not hurt seriously, as the road was not very hard. The steering knuckle had broken; the machine was put into the farmer's shed, and the next day the old steering knuckles were exchanged at the factory for others (free of charge). On the following day we started for home, but stopped over at New Haven on account of rain. We left New Haven on the following morning, and arrived home by sundown.

On the morning of one of the hottest days we had this summer we started out again, going by way of Yonkers, Tarrytown and Ossining, and reached Peekskill by noon. We brought the vehicle to a livery stable while we went to a hotel for lunch. We then crossed the mountains for Mattawan. The trip proved that in such hot weather air cooling is a success and that the carriage was powerful enough to climb any hill we met without flinching. And we never experienced any trouble whatever on this score, but when I stopped the engine to wait for the ferryboat to take us over to Newburgh I could not get it started again, and we put the vehicle in the hotel shed for the night. I worked several hours the following morning before I found that the priming cock was leaking, flooding the engine. Turning the carburetor back several divisions remedied the trouble, and we went across the ferry to Newburgh, put gasoline on board and rode down the State road to Mountainville, where we enjoyed a few days rest in the country. On Monday morning we left for Turners, Suffern and the Weehawken ferry, which we reached at 4 o'clock in the afternoon. On the ferryboat the machine developed some strange antics, evidently thinking it had done enough, for when I turned the starting crank near the New York shore I could not disengage the gears from the engine, and the machine was pushed ashore, but would start off when I started the engine. Deeming it unsafe to ride through the streets of New York, I had recourse to the hay motor to pull me home (the first and last time). When taking the machine apart the next day we found a phosphor bronze chip wedged in between the wall of the drum and pinion of the low gear. This removed, the dent filed smooth, the parts reassembled and my carriage was itself again.

In August we decided on a trip to Cornwall. Arriving five minutes late at the Tarrytown ferry, we waited an hour for the ferry to Nyack. The machine started with a whirr on and off the ferryboat, but a few blocks from the ferry it laid down. The spark plug was in good condition, but after an hour's work I turned the carburetor to division point 3, started the motor up and then turned the carburetor to point 8 to obtain full power. We arrived at our destination by sundown. I took the air tube out and found the wire netting clogged, and also ripped apart in two places. Not having the proper tools there I left the machine as it was, starting the engine by turning the carburetor back and forth, and got home all right, after staying a week in Orange County, without any trouble. On my arrival this gauze trouble was attended to and the machine put in shape as good as ever.

We have now decided to tour Long Island (next week) at the rate of 2½ miles an hour or more. We both love the sport, and as we do not drive fast, but ride for recreation and to see and admire the scenery, the machine does not give us much trouble, and we have always been able to remedy the troubles.

A. D. Evertsen.

A Motor Bicycle Trip.

Editor Horseless Age:

As a pioneer user of motor bicycles in this State (South Dakota), I have had my share of experience. With two exceptions I always rode my wheel home when out on a trip, and in both instances the wheel was disabled by breaking the upper end of the front fork, sufficient proof to me that at least in my wheel this is the weakest point.

I have also had some trouble with the coaster brake—another feature that needs improvement. I have had many other breaks, such as bolts and battery wires, but nothing I could not fix on the road.

Proper cylinder lubrication is a difficult proposition, and I have had some trouble there.

I have also found myself out in the country without gasoline, but by throwing the belt off easily peddled a mile or two to a farm house, where I have always found sufficient gasoline to take me to a store where it was kept for sale.

My experience two weeks ago may be of interest to your readers, as it will show what troubles a rider may have, and how they may be met.

On Sunday, at 10 a. m., I started out on a 75 mile trip. The weather was good, and the roads were fair, the greatest obstacles being deep dust in places and deep ruts in others.

These two items did not, however, prove serious. I had made about 20 miles the first hour, when in a nice, smooth road, and while running slow, the front fork gave way, breaking off in the tread, between the upper bearing cone and the lock nut holding it secure. This left the handle bars entirely detached with nothing to steer the front wheel.

Fortunately, I stopped the wheel without getting a tumble. I was then 2 miles from

a town, and I concluded I was "up against it," as it was Sunday, and the break was such that no one except a first class machinist with suitable outfit could mend the break. No trains were running, and it looked like a stay until the next day. While pushing the wheel to town, I conceived the notion that by taking a piece of iron three-sixteenths inch thick and about 4 inches wide, bending one end of same around the handle bar, bolting it to the latter, and bolting the other end securely to the front fork just above the wheel that it might work.

So when I got into the town I hunted up the only blacksmith there and told him my tale of woe. He said he was very sorry, but that he couldn't even ride a bicycle, to say nothing about brazing a broken fork. He finally agreed to "tackle the job" if I would tell him what to do, which I did, with the result that I not only made the 75 miles undertaken, but have run the wheel a great many miles since.

That day's troubles were not over with the repaired fork. Everything went along very nicely until just at dark, when I was still about 10 miles from my destination, when a sudden bumping of the wheel warned me of disaster, and on dismounting I found a tenpenny nail driven clear through the rear of the tire, close to the valve, and going through both ends of the inner tube twice, or rather going through both sides of each end. Here was trouble! Ten miles to town—no light, and 2 miles to the nearest farm house. Nothing was to be done but push the wheel to the farm and repair the tire, or push it the 10 miles to town. The farm house appealed most strongly to me, so to the farm house I went, borrowed a lantern, sat out on the porch, and took out the damaged tire, repaired it and rode into town by the light of the moon, partially obscured by clouds. After all my trouble I would not trade the wheel for the best team in the State if I had to use the team. In my business the wheel saves me time and saves me money.

E. A. COOPER.

Training Horses in Kansas City.

Editor HORSELESS AGE:

The following clipping taken from the Kansas City *Star* will show the method used by Kansas City in getting the horse more thoroughly acquainted with the automobile:

"Ordinary traffic will doubtless be impeded on Gladstone boulevard next Wednesday morning. The street, from Independence avenue to the Concourse, will be transformed into an automobile school for horses. In these four blocks they may shy as much as they please, so long as they do not jump over the bridge railing. One of the noisiest machines in town has been selected to instruct horses which persist in becoming frightened.

"A horse, well handled, can be accustomed to a noisy automobile in a comparatively short time. It is the same idea as breaking a country horse to street cars. The automobile will give the horses every chance to get accustomed to its vagaries, so that runaway accidents from this cause may keep growing fewer constantly.

"A number of horse owners are anxious to bring their animals on the boulevard on Wednesday. Some of them do not know whether it is best to ride or to drive them. The Eastern custom is to drive, for a saddle horse is too apt to wheel around, a thing that would hardly be desirable with a buggy. Other automobilists beside the instructor may be on the scene to treat stubborn horses individually. The Automobile Club is desirous of having horse owners co-operate with it in regard to the school, which may be held every week if there is a demand for it."

This shows that the horseman has seen the advisability of getting his animal used to the "puffing machines," as most of the horse papers are pleased to call the modern autos. They see that it is of little use to try and keep the automobile down, therefore the safest thing is to accustom the animals to the machine, that accidents may be fewer in the future. Horsemen experienced the same trouble with the trolley that they have experienced with the auto, but after satisfying themselves that the cars had come to stay they proceeded to get the horse through the "training school system," with the result that there are very few accidents from this cause. Kansas City has the right idea. Let more of the cities follow the example.

JAMES G. BLAINE.

A Very Low Cost Account (Estimated).

Editor HORSELESS AGE:

I am the owner of a light gasoline runabout, the original cost of which, including extras I desired, was $760. This machine I have used eleven months, and with the exception of perhaps five or six days it has responded to my urging, and is so reliable that I have done away entirely with horses.

Like other owners of automobiles I have had some troubles, my repairs costing about $100, as near as I can figure it, from receipts and a recollection of what I have paid out. Many of the repairs were necessitated by a want of experience, and as I look back it is my impression that more than half of the above sum should be charged to "inexperience," instead of to repairs necessary. My operating expenses, i. e., cost of gasoline, dry cells, cup grease, carbide and oil, have been less than $50 for the eleven months.

To make a very liberal estimate, $150 is the amount I have expended after the original cost, and I calculate my mileage on the same liberal basis at 9,000 miles. This makes 1⅔ cents per mile, the vehicle carrying four passengers frequently.

This showing is so much in contrast with that reported in some communications that have recently appeared in THE HORSELESS AGE that one is liable to be judged as unfair and the other as t thusiastic; but it is my belief, as i come, it will be found that two op of machines of the same pattern wil widely different reports to make, sh the difference to be in the operator

I believe my calculations are abo rect; they may not be entirely c but from a review of the past months I know they must be very My machine has been put to some tests; it has been driven 140 miles day, and frequently 75 miles in on no hill has ever been too steep for it has come out of mud holes of th and sticky kind until I have lean have great respect for the power the body cover.

L. M. R

Explosive Engine Queries

Editor HORSELESS AGE:

I have a gasoline engine of 4½ bore and 6 inch stroke, which troubl It is water cooled, but the water do circulate around the valve chamber, it gets very hot in a few minutes; i in about two minutes it gets so hot t oil from the cylinder burns—that oil that gets into the valve chamb the oil on the valve stems and ignite I believe the valve chamber would ı hot inside of ten minutes. I would know if there is any remedy for thi ing. I suppose there is, or it wou be possible to run the air cooled mc am intending to use this engine stat although, I think, it was built for purposes.

W. A. PE

[We have seen larger engines th one run quite satisfactorily witho valve chamber being water jacket these engines had a front exhaust, a valve chambers were at some distanc the cylinder and connected thereto walls of a passage. If your valve c overheats when the exhaust valv igniter are timed correctly, and ther undue resistance in the exhaust muff only remedy we can think of is to new valve box made, either water j (if this be possible) or provided wi flanges, as in air cooled engines.—E

How Not to Test Spark Pl Queries.

Editor HORSELESS AGE:

In your last issue you describe " liar fire accident" which happenec Japanese. I would like to say th kind of accident is not so rare as yo think. I saw the same thing happen times myself, and it has happened also, but just once only, at which scorched my eyebrows a trifle. I v plain how it happens nearly every

When an engine misses explosic mostly think it is the fault of the The next thing is to take out the plug and see how the points are; are all O. K., we try and see how or hot a spark it does make, and we

fore, close the switch and hold the plug in contact with the cylinder at the opening where same comes out (as the rest of the engine is nearly always heavily painted), and let it spark. Sometimes, of course, there is a charge in the cylinder, which will be exploded by the spark. You can imagine how it surprises a fellow the first time. In some engines, in order to see how the igniter works, you must take off a cap or plug, and the mixture which was left in the cylinder from previous revolutions is likely to be exploded. In such cases I would advise turning the engine over a few times, with the carburetor shut off, in order to clean the cylinder of explosive mixture. And on engines, where you can take out the whole plug, don't hold it over the plug opening while testing the spark, but make connection at some other point (a stud or cap screw) free from paint. It is a good plan to always stop the engine by turning off the gasoline first, next the battery switch, and lastly the lubricators.

In conclusion I would ask a few questions: Why is it that in some engines when explosions are missed in the cylinder there are explosions in the muffler, while in others misfires in the cylinder are not accompanied by explosions in the muffler?

How much pressure is required to force or lift gasoline from a 20 gallon tank 4 feet high in a three-eighths inch pipe?

CHARLES KAUFMANN.

[In reply to the first question, the reason, we think, is a difference in the construction of the mufflers. If a charge is passed into the muffler without being burned in the cylinder, an explosion can only take place in the muffler if the flame of the exhaust at the following explosions in the cylinder gets into the muffler. In some mufflers the exhaust must pass through fine perforations or narrow slots before it gets into the muffler chamber, and it is well known that a flame will not pass through a perforated metal wall. In other mufflers the exhaust pipe leads directly into a large expansion chamber, and if this chamber is filled with explosive charge during one stroke of the engine the flame of the exhaust at the next explosion stroke will pass into it and explode the charge in the muffler. As there is nothing else to ignite the charge in the muffler than the exhaust flame, if the latter cannot get into the muffler there will be no muffler explosions, even if there be misfires in the cylinder.

A pressure of 1¼ pounds per square inch on the surface of the gasoline in the tank would just lift it 4 feet, but the pressure must, of course, be slightly higher to overcome friction in the pipe and at the nozzle.—ED.]

Although the shortening days and the cooler nights are disagreeable reminders that the winter is approaching, there are many who consider that September and October are the ideal touring months.

Advertising Signs on Contest Vehicles.

Editor HORSELESS AGE:

It is, of course, easier to criticise than to originate, but it seems to the writer that the Automobile Club has made a serious mistake in refusing to allow advertising signs on the vehicles competing in the New York to Boston contest. The object of this contest is to further the cause of automobiling and educate the public concerning the good and bad features of the vehicles entered, and while for identification by those who are connected with the club or have access to the club's lists numbers are provided on each vehicle, the fact remains that the many thousands of people who will see this run will not be able to recognize the various vehicles, and much of the advertising will be lost because of this fact. While the disadvantages of permitting the vehicles to be papered with signs and advertisements are clearly apparent, there seems to be no good reason why the club should not furnish or permit the entrants to supply themselves with at least two pennants of uniform size, bearing in legible letters the name of the vehicle to which the pennant is attached. Each yacht flies its club colors and bears its own name; each exhibit at the automobile show is made as prominent as possible by signs, and the only requirement to insure the best results is that the signs be of a satisfactory and uniform size, a thing which could readily be accomplished. While many vehicles in the run may be entered by owners, some of them would gladly fly a pennant bearing the name of their vehicle, and the others would doubtless prefer the pennant to show their name, but it is certain that the vehicles entered by manufacturers could not do better than to carry the manufacturer's pennant.

While this suggestion is probably too late to be of value this year, it is to be hoped the club will see fit to take advantage of it in future events.

CHAS. E. DURYEA.

[We cannot agree with our correspondent in this matter, believing that the disadvantages would be greater than the advantages. All the trade and leading daily papers will publish lists of entries, with number and name of manufacturer of each entry, so that anyone who is really interested will easily be able to find out the name of each car. Too much advertising display in the contest would certainly lessen the interest of the public.—ED.]

Experience of a User.

Editor HORSELESS AGE:

In September, 1899, I placed an order for one of the popular steam carriages, which I received April 15, 1900, and have used it up to the present time in my business—not exclusively, however, as our climate and roads do not permit of the practical use of an automobile during the winter months. I have used the steam carriage on an average of about eight months in the year for the past three years and my odometer registers 12,414 miles, which is not the whole of my mileage, as the odometer was not always registering. I formerly kept four horses; now during the automobile season I keep one for emergencies, and of the remaining three I have sold one, put one at pasture and let one out for keeping. I intend to sell one or two more, as I can get all I want to use for their keeping during the winter months.

I find I am able to save from one to two hours a day with the automobile over fast road horses, and find myself less jaded after a hard day's work; but I have had "my troubles" and I think everything has happened to my carriage that could happen, except to be "towed home." The successful use of an automobile depends upon the perception and foresight of each individual user, and, it is needless to add, some mechanical skill. The carriages of today are much more perfect and stronger in every part, and consequently less liable to get out of order. The appended figures are not given in detail, but are correct as to the amount:

Cost of steam carriage, April 15, 1900	$650.00
Improvement, such as top, folding front seat, lamps, double acting brake, hamper, auxiliary pump, side steerer, inspirator, coil in muffler, etc.	249.00
Repairs, renewals and tires	394.80
Gasoline	171.00
Total	$1,464.80

I cannot give the actual cost per mile, as I still have the carriage, which has lately been overhauled, new bevel gears put in, new throttle, new rear tires, new spokes and new burner added, expense of which is included in the items above. There is no reason why this carriage will not run two seasons more with only a slight increase in expense of repairs, but I have recently purchased a gasoline machine with which I expect to add to my experience and enable me to better advise the medical profession as to the proper automobile. Shall keep my steam carriage for a while, as my man says, "to tow home the gasoline." If I am able after a time to sell my old carriage for $350, and I add the interest on its first cost, then the cost per mile can be estimated, roughly, to be about 9¼ cents, which looks more encouraging than Dr. Longaker's cost per mile.

Now as to horses. After twenty-five years' experience with horses and carriages I am satisfied that it will cost at least 12 cents per mile for every mile traveled, to say nothing of the time saved to the busy practitioner. In order to justly estimate the cost of horses and teams we ought to include our family or

two seated carriage, our double harness and everything incidental to a complete establishment, as many of us use our automobiles for two and four people for pleasure and business. Then, a $300 horse dies or gets lame and worthless, veterinary bills are incurred, and all items must be figured in the sum total of expense.

The proper automobile for a physician is the one which is not too heavy nor too light. With such a vehicle he will largely avoid tire expense and breakages. My tire expense was only $64, as compared with Dr. Longaker's $166.06, which is due to difference in weight of carriages.

DR. E. H. ELLIS.

The Auto or the Man.

Editor HORSELESS AGE:

I once heard a dealer in automobiles say to his demonstrator: "Follow that man up, he's got the fever proper and now's the time to land him." I in time was attacked with the same disease and was "landed." With the caution of all novices I investigated electric, steam and gasoline carriages, heard the agents talk valves, gears, clutches and vibrators until, not knowing one part of an engine from another, my dreams at night were visions of Red Devils, White Ghosts and Black Phantoms.

Finally a friend of mine purchased a light gasoline carriage; I ran a close second, and troubles began. On my first trip to Atlantic City a throttle wire broke. It was easy to find a repair man; one yard of piano wire and half an hour's time remedied the trouble; bill $1.75. Coming home the vibrator worked loose; the shark who undertook the repair job really seemed to work hard for three hours, at 75 cents per hour, and finally the garage was reached with a sad but wiser man.

The lesson learned was this: Never take your automobile out until you have mastered and know every part of your engine or motor. One couldn't perform on the piano without being conversant with the keys. Dirty work, you say? So is taking a fish off the hook or picking the bone of a chicken, but the results in each case are gratifying.

A mere matter of batteries, I was informed when mine were growing weak. "How much a set for new ones?" "One dollar per set," says Mr. Man. "Put in two new sets, please." At the end of the month I received a bill for $3.50. "How is this? You said $1 per set." "Oh, yes, but the extra is for putting in, testing, etc." I now buy the same make of cells for 80 cents and connect them up in fifteen minutes.

Don't howl because you are charged excessively for gasoline, and don't pay for any unless you see it put in the tank yourself. We all make mistakes, and you may be paying for some other fellow's fuel, or they may have omitted to put in that which they did not neglect to charge up.

When you have a case of heavy repairs which necessitates sending the machine to the shop, write out an order, taking a copy, setting forth that specific item, and see that no other work is done or, better yet, paid for. The shark will soon see that you mean business and will take the bait accordingly.

Lubricating oil to your engine is as food to your body; without either the mechanism soon gives out. Ordinarily don't neglect the oil can; if it's automatic, watch it; any automaton shirks duty occasionally, and while it may not be enough to damage the vitals at the first or second omission, "there'll come a time some day." Numerous valves and running parts require a thorough cleansing at intervals, and while jumping on the seat and starting off for a jaunt is by far easier than working half an hour first, it is not a guarantee that you will arrive home on the same seat. See the engineer on the locomotive every time it stops. Is he howling to the fireman of overcharges and cost of maintenance, or is he steadily looking over his engine and preventing the occurrence of these things? My sincere advice to the kicker is: Take a day off. Take every portion of your engine apart, then put it together, if you can, and when you have at last mastered this probably you will have a larger bank roll the following months.

I do not mean to say that there are not honest repair men in the trade, although I, personally, have not found one yet; but in over 5,000 miles, covering a period of five months' usage of my carriage, exclusive of the first week, I have never been towed home, nor had a break that I could not repair, and the total cost of my shop bills have not exceeded $25, or much less than it would have taken to have shod a horse.

A gas engine is like a baby—it gets sick and can't tell you what's the matter with it. That is where an operator wants to show himself that he is not entirely devoid of gray matter, and he will then, I am sure, feel that his (automobile) pathway through life is not so thorny after all.

T. HAINES MOORE.

The Common Sense View of Automobiles.

[From the New York Journal.]

The automobile, the latest device for facilitating man's circulation on the globe's surface, is a permanent and immensely valuable addition to our possessions. It should be welcomed and encouraged by every man with intelligence sufficient to enable him to look even a short distance into the future.

The law should regulate strictly the owners of fast automobiles. No man should be allowed to operate such a machine on the public highways unless he has proved his capacity and his sobriety.

Reckless disregard of laws by owners of automobiles should be severel ished.

Whoever willfully endangers hun should be punished by imprisonmen out option of fine—whether he be a mobilist or any other criminal.

If any man's automobile interfer the safety of another person, th should be punished.

And if any man wrongfully in with an automobile or its owner he be punished.

The average individual who der automobiles or violently interfere them today imagines that he is sim turbing the amusement of some ric

Usually he is disturbing a ricl But invariably he is also interferin the future comfort of all citizens.

When bicycles first came into u were very expensive and were mainly by the very prosperous. M especially women, on bicycles mocked. Vexatious laws were fra interfere with them. But, thanks support of the more prosperous, l soon became cheaper in price. The used more and more generally. they are valuable mainly to the les perous among us, to those who ri them but a few years ago.

It will happen with the automobi happened with the bicycles.

The automobile is developing in effectiveness and in cheapn could not develop in this way but fact that manufacturers are encc to do their best by men able to pa prices.

It is true that the automobile t a rich man's amusement. But bec is the rich man's amusement today, be everybody's convenience a few from now. * * *

The men who own the fast auto today are sometimes reckless. Wh are reckless they should be punish ignorance and envy should not l mitted to combine against a gre needed public benefit.

The ignorant man who throws at the automobile today throws st his own future comfort.

The ignorant countryman who unnecessary laws against reasonabl is legislating against his own welfa is fighting an agency which in a fe from now will put his village a home in touch with the great citi prove his real estate, and make l son and his crops independent of extortion.

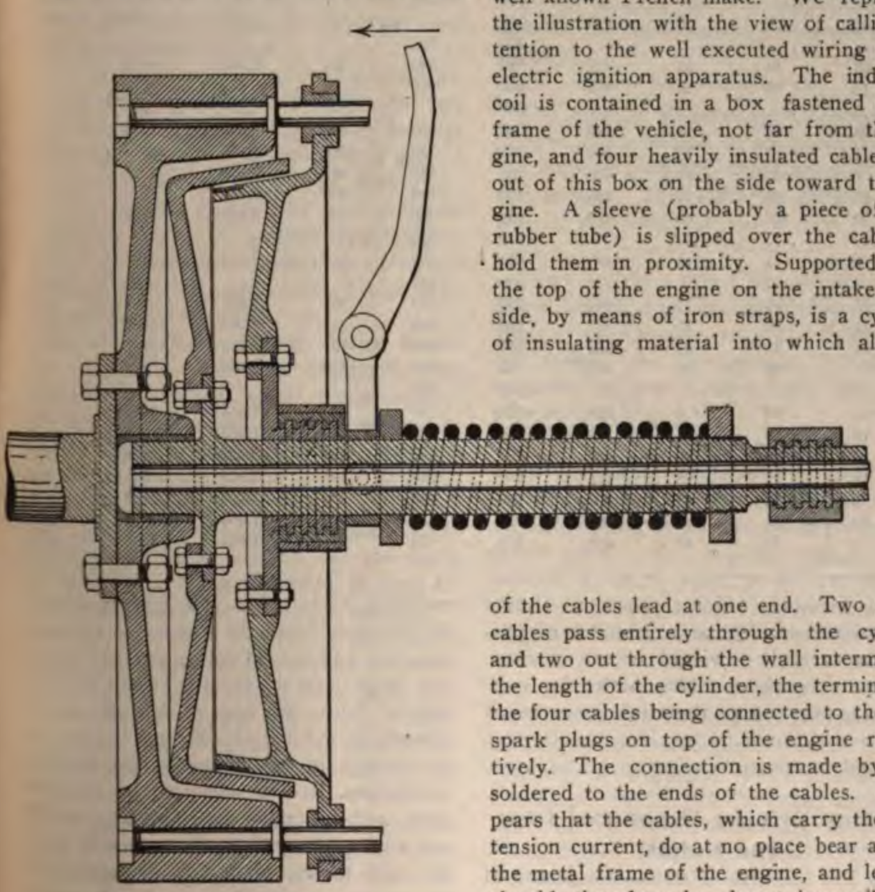
The A. C. A. has issued two ne cards, one from New York to the shire Hills, Pittsfield, Mass., and th from the Hudson and Connecticu through the Berkshire Hills. Bo the consecutive mileage and inter distances between towns.

...OUR... FOREIGN EXCHANGES

A New Panhard Clutch.

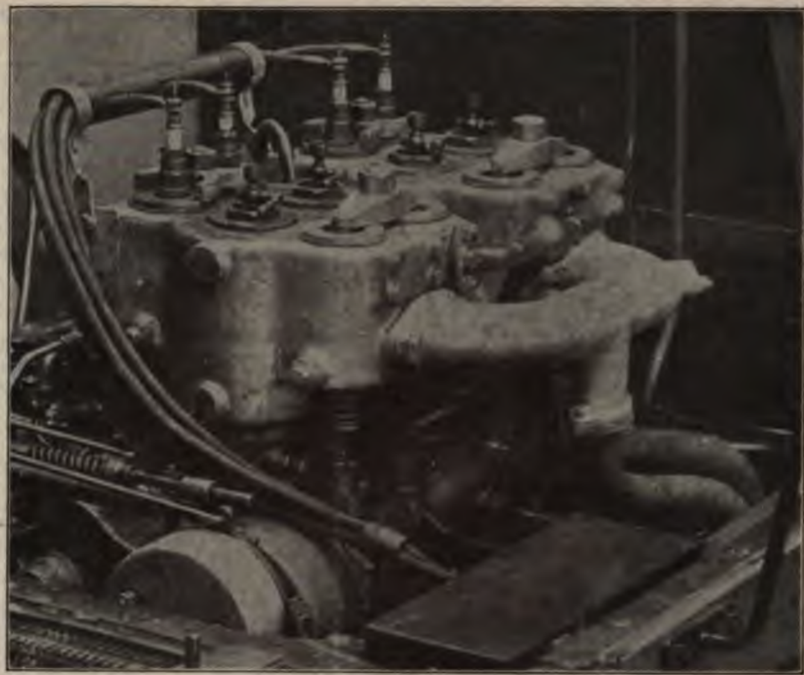
The problem of doing away with end thrust at wearing surfaces in conical friction clutches leads to constantly new solutions. The latest clutch of Panhard & Levassor, in which this object is accomplished, is shown herewith. It will be seen that although the clutch is located within the flywheel the latter does not form a part of the clutch itself.

The engine shaft ends at the flywheel, which is bolted to a flange thereon. The flywheel is provided with a central brass bushed bearing, and in this bearing is supported a clutch shaft (shown as a hollow shaft), which at its other end is journaled in a thrust bearing. To a flange on this shaft is bolted the female part of the friction clutch. The cone of the clutch is bolted to a sleeve mounted loosely upon the clutch shaft and is driven through studs projecting from the flywheel rim, which pass through bushings in a flange of the cone. A grooved collar which is engaged by a pedal lever engages with the sleeve of the cone by a sort of grooved bearing. A strong helical spring is interposed between the grooved collar and a nut on the clutch shaft. Since both these parts turn in unison when the clutch is driving, there is then no loss by friction on account of end thrust. The thrust bearing at the end of the clutch shaft insures that the latter is not displaced when the spring is compressed by means of the pedal to "throw out the clutch."



PANHARD CLUTCH.

A Mechanical Wiring Job.



IGNITION CABLES ON A FOUR CYLINDER MOTOR.

The illustration herewith, from *La Locomotion*, shows a four cylinder engine of a well known French make. We reproduce the illustration with the view of calling attention to the well executed wiring of the electric ignition apparatus. The induction coil is contained in a box fastened to the frame of the vehicle, not far from the engine, and four heavily insulated cables lead out of this box on the side toward the engine. A sleeve (probably a piece of hard rubber tube) is slipped over the cables to hold them in proximity. Supported from the top of the engine on the intake valve side, by means of iron straps, is a cylinder of insulating material into which all four of the cables lead at one end. Two of the cables pass entirely through the cylinder and two out through the wall intermediate the length of the cylinder, the terminals of the four cables being connected to the four spark plugs on top of the engine respectively. The connection is made by lugs soldered to the ends of the cables. It appears that the cables, which carry the high tension current, do at no place bear against the metal frame of the engine, and leakage should, therefore, be almost impossible.

The Rambler gasoline carriages are soon to be placed on the English market by a London importing syndicate.

A "pedestrians' protection league" has been formed in London to protect pedestrians against law defying automobilists, horse drivers and bicyclists.

The proposal to hold speed trials at Blackpool, England, on the sea front, has been abandoned, owing to the proposition not being received favorably by the manufacturers.

The hill climbing trials which were to have been held by the Belgian Automobile Club at Spa, on September 22, were abandoned on account of the death of the Queen of Belgium.

The King of Italy has been taking part, in an automobile, in the manœuvres of the Italian army, making daily runs for a week, covering the whole area of Piedmont, with Raconis as a centre.

The A. C. G. B. and I. some time ago offered a prize of £100 for an effective dust prevention device; the time of the contest has now expired and no award has been made, since, in the opinion of the judges, no proposition has been put forth to justify a trial.

The secretary of the Lincolnshire Automobile Club suggests the use of confetti to indicate police traps. When the motorist discovers an ambush he will scatter a handful of confetti on the roadway a short distance before the spot, so that following motorists may be warned. Confetti may at last come to serve some useful purpose.

Summary of Marks Secured in the A. C. G. B. and I.'s Reliability Trials.

Official Number.	H. P.	Vehicle.	Total Marks for Reliability. Maximum, 1,800.	Order According to Total Marks.	Hill Climbing. River.	Hill Climbing. Westerham.	Condition. Maximum Marks, 500.	Steering. Maximum Marks, 250.	Brakes. Maximum Marks, 250.	Horse Power and Weight Marks.	Grand Total.	Speed on Miles Per River.
1	3	Humber Bicycle	1,796	1	418	....	430	250	250	100	3,243	21.1
2	2	Humber Bicycle	1,772	43	....	....	325	200	250	....	2,547	....
4	5	Century Tandem	1,790	24	137	....	500	250	125	70	2,872	9.8
5	5	Baby Peugeot	1,799	4	125	130	425	250	250	78	3,057	9.3
6	1¼	Werner Motor Cyclette	300	....	....	....	....	250	....	....	....	....
7	1¼	Ormonde Bicycle	1,717	45	....	....	225	250	250	....	2,442	....
8	4	Oldsmobile	....	....	....	....	....	250	250	....	....	....
9	5½	Locomobile	1,686	34	57	61	400	250	200	99	2,753	15.1
10	5½	Locomobile	1,736	33	47	42	450	250	150	79	2,754	13.0
11	4½	Swift	1,171	....	....	....	....	250	200	....	....	....
12	8	Parr Light Car	288	....	....	....	....	250	200	....	....	....
19	7	Star	1,718	42	35	38	300	200	200	77	2,568	5.3
20	5½	Locomobile	1,382	47	39	35	350	250	150	73	2,279	12.2
21	5½	Locomobile	1,780	32	36	39	440	250	150	89	2,784	13.5
22	4	Renault	1,624	37	55	....	485	250	250	57	2,721	7.4
23	8	M. M. C. Voiturette	1,751	9	52	60	500	250	250	119	2,982	6.7
24	6	De Dion-Bouton	1,735	17	84	87	440	250	200	118	2,914	9.9
26	6	White Steam Car	1,722	35	53	32	500	250	125	67	2,749	11.3
29	6	White Steam Car	1,799	26	53	63	500	250	125	72	2,862	10.2
30	10	Decauville	1,770	25	25	31	440	240	250	112	2,868	7.3
31	10	Georges Richard	1,481	....	45	....	....	250	....	136	....	8.3
32	9	James & Browne	1,776	19	40	47	465	250	200	123	2,901	7.3
33	12	Gladiator	1,789	31	48	23	500	250	50	125	2,785	9.2
35	10	Brooke	1,772	22	25	32	470	250	250	86	2,885	5.5
36	8	Light car fitted with Simms motor	1,526	49	47	....	....	250	....	99	1,922	7.2
38	10	Star	292	....	....	....	225	250	200	....	....	....
39	10	Wolseley	1,651	41	....	....	495	250	250	....	2,646	....
40	7½	Wolseley	1,785	27	28	....	500	250	200	99	2,862	7.5
41	10	Wolseley	1,795	10	49	61	500	250	200	126	2,981	8.2
42	12	Belsize	1,795	21	40	39	475	250	200	88	2,887	6.8
44	9	New Orleans	1,794	12	53	51	485	250	200	115	2,948	8.8
47	8	De Dion-Bouton	1,758	8	51	46	500	250	250	127	2,982	8.3
48	8	Clement	1,678	40	31	....	425	250	250	40	2,674	6.1
51	12	Gladiator	1,643	38	40	42	495	250	50	174	2,694	10.8
52	10	Ariel	1,648	29	40	32	480	250	250	114	2,814	8.7
53	14	New Orleans	1,199	....	....	....	....	250	250	....	....	....
54	12	Century	1,452	48	66	59	240	150	....	115	2,082	8.7
56	14	New Orleans	299	....	....	....	....	250	200	....	....	....
57	10	M. M. C.	1,734	36	24	31	415	240	200	103	2,747	6.0
59	7½	Germain	1,791	18	25	24	490	250	250	82	2,912	6.1
60	20	Georges Richard	....	....	....	....	....	250	....	....	....	....
62	6	Gardner-Serpollet	1,718	23	33	29	495	250	150	204	2,879	16.7
63	6	Gardner-Serpollet	1,761	14	39	29	500	250	150	201	2,930	16.2
64	10	Peugeot	1,798	2	56	42	475	250	250	247	3,118	13.9
65	12	Brush	1,634	39	25	5	465	250	200	108	2,687	8.5
66	12	Humber	1,794	20	26	30	470	250	200	122	2,892	7.8
67	12	Humber	174	....	....	....	....	250	250	....	....	....
69	20	Wolseley	1,800	6	34	41	495	250	200	210	3,030	13.7
70	10	Mors	1,129	....	....	....	....	250	250	....	....	....
71	8	Wilson & Pilcher	1,787	15	26	10	500	250	250	105	2,928	8.3
74	15	Germain	1,797	11	36	40	465	250	200	174	2,962	12.3
75	16	Clement	1,574	44	29	35	130	250	250	197	2,465	12.4
76	12	Daimler	1,786	7	28	30	475	250	250	166	2,985	9.7
77	12	Daimler	1,196	....	....	....	....	250	200	....	....	....
81	20	M. M. C.	1,495	46	20	6	250	250	250	142	2,418	10.7
82	20	Maudslay	1,797	16	26	27	500	250	200	115	2,915	9.5
83	20	Pascal	1,716	28	28	25	450	250	200	186	2,855	15.3
84	20	Pascal	1,780	13	22	28	475	250	250	140	2,945	8.7
86	22	Daimler	1,792	5	28	33	500	250	250	179	3,032	13.0
87	22	Daimler	1,663	30	21	....	500	250	150	206	2,790	13.7
88	15	Panhard	1,799	3	41	37	500	250	250	212	3,089	16.5

Official Results of the A. C. G. B. & I.'s Reliability Trials.

We print herewith a table showing the marks received by each of the competing vehicles in these trials under the different heads. It may be well to recall that in hill climbing the marks were determined by the following formula: (Horse power as shown by performance × 100,000) ÷ (Price in £ × 8 for every shilling's worth of fuel consumed). The ho[rse power and] weight marks were [determined by the fol]lowing formula: (Horse power as shown by performance × 100 × number of passengers carried) ÷ weight of car in cwts. without passengers. The marks for condition at the end of the trials were based upon a maximum of 500, and marks were deducted for parts needing to be replaced.

Furious Driving Denounced from the Pulpit.

The Rev. Charles Hobbs, the pastor of the Baptist Church at High Wycombe, England, on the occasion of his last monthly service for young men, s[elected] as his text: "And the watchman tol[d, say]ing, He came even unto them, and c[ometh] not again; and the driving is like th[e driv]ing of Jehu, the son of Nimshi; [for he] driveth furiously" (II Kings, ix., 2[0]). [In] the course of his discourse, the re[verend] gentleman, having outlined the car[eer of] Jehu, and described him as a dashin[g offi]cer who made a great dust when he [drove] through towns, went on to declar[e that] motor cars were leaving Jehu's [chariot] horses far behind in the race.

Causes of Loss of Marks in the English Reliability Trials.

(Concluded from last issue.)

No. 1, 3 Horse Power Humber Motor Bicycle.—Lost five marks for the rider dismounting on Westerham Hill on Tuesday. On Friday it was pedalled on the steepest part of the hill and no marks were awarded for the climb.

No. 2, 2 Horse Power Humber Motor Bicycle.—Lost twenty-eight marks, all through ignition troubles.

No. 7, 1¾ Horse Power Ormonde Motor Bicycle.—Lost twenty-eight marks through ignition troubles, fifteen for walking up Westerham, thirty for walking up both Westerham and River hills, and five for stoppage.

No. 9, 5½ Horse Power Locomobile.—Lost thirty-nine marks for taking in water, forty for chain troubles, twenty-nine for broken chain, one for tightening brake, and five for changing a tire on the road.

No. 10, 5½ Horse Power Locomobile.—Lost thirty-three marks for taking in water, three for relighting burner, eight for refitting pinion stud, five for broken chain, and one for tightening up differential.

No. 11, 4½ Horse Power Swift.—Lost a single mark on the first day for a removal of the suction pipe. On Tuesday and Wednesday twenty-three marks were lost for dismounting on the hills, and on Thursday five marks were lost due to sparking trouble. On Friday some teeth of the gear gave way, and the car was withdrawn from the run.

No. 12, 8 Horse Power Parr Light Car.—Lost twelve marks the first day through a broken chain. The second day the car broke down, and retired from the trials.

No. 22, 4½ Horse Power Renault.—Lost 116 marks during the first and last days' runs, owing to ignition troubles, five were lost through a puncture, three for stopping on a hill, and eleven for passenger walking Westerham.

No. 26, 6 Horse Power White Steam Car.—Put in a new boiler on the Sunday (the day before the actual trials began), for which sixty-eight marks were deducted, and ten were lost during the runs for taking in water and filling cylinder lubricator.

No. 29, 6 Horse Power White Steam Carriage.—This car actually lost one mark for being one minute in excess of time allowed for cleaning, etc., in the garage.

No. 31, 10 Horse Power Georges-Richards.—Lost nineteen marks up to Saturday through replenishing fuel tank, tire trouble, and by being helped up Westerham Hill. On Saturday the differential gripped and the car was put out of the run.

No. 38, 10 Horse Power Star.—Lost eight marks on the first day's run through a slipping clutch and for lubricating. On Tuesday the car did not complete the course, owing to a breakdown, after which it was withdrawn.

No. 47, 8 Horse Power De Dion.—Lost forty-one marks in the garage for excess time in adjusting throttle valve and brakes and in repairing the water tank. As reported last week, the car lost but one mark on the road.

No. 53, 14 Horse Power New Orleans.—Lost but one mark up to Friday, on which day an axle fractured, and the car retired.

No. 56, 14 Horse Power New Orleans.—Was put out of the run on Tuesday when a bevel wheel broke. On Monday one mark was lost.

No. 60, 20 Horse Power Georges-Richard.—Broke down on the first day.

No. 67, 12 Horse Power Humber.—Broke a lug on the back axle on the first day, and had to retire on the Tuesday.

No. 70, 10 Horse Power Mors.—After losing seventy-one marks on the first and third days for ignition troubles, broke down on the Friday through a split pin coming out of the nut on the main shaft; the nut unscrewing caused a bearing to grip.

No. 77, 12 Horse Power Daimler.—Broke its differential on the Friday, up to which day only four marks had been lost for putting a new washer on induction pipe.

The "Passe Partout" is on the road again and has arrived at Warsaw, Russia.

M. E. Guigon has been appointed manager of the Locomobile Company's Paris agency.

The Belgian Minister of Transports has ordered the purchase of an automobile for the engineers of the department of roads and bridges. Hereafter the Belgian roads will be inspected per automobile.

There will be a 100 kilometre (62 miles) motor bicycle race on the Prater track at Vienna, on October 12. The bikes must not weigh over 110 pounds, but in case magneto ignition is fitted they may be 15 pounds heavier.

La Locomotion Automobile correctly observes that while sometimes a horse may be scared less by an automobile when the latter passes him rapidly, automobilists will do better to stop, as in case of accident and consequent proceedings they will find it much easier to prove their innocence.

Automobilists of Lisbon, Portugal, are contemplating the organization of a race, starting at Figueira, over a route 207 kilometres in length. A race committee has been appointed, consisting of Messrs. A. de Sousa, Dr. Anachoreta, E. Norontia and A. Lacerda. It is expected that the affair will result in the formation of a club.

A Motor Bicycle Tour on the Continent of Europe.

By Joseph Pennell.

(Concluded.)

Still I started bravely. But it was too much, though not for the engine, which was working bravely. I had only been able to get in Turin ordinary engine oil from the automobile people, and before I had mounted 5 kilometres the oil was burning, the engine smoking and smelling hot. I had to stop. And then I couldn't start; it was too steep. Five times I went back and tried, and five times I failed. I could have pushed over, of course, but there is no glory in that. In fact, after the first 10 kilometres up to the actual pass it is ridiculously easy. But I didn't know this, so the night was passed at Susa, and next morning, in rain and snow, by the aid of a cart, a dog, two horses and a man, crouching shivering under an umbrella, I crossed Mont Cenis from the Italian side, and the customs people told me that I was the first, even in that ignominious fashion, to do so. From the French side it is nothing, from the Italian difficult, though with good lubricating oil I believe I should have done it. Some day I may have the chance to try again.

Only when I got to the very top did I find the last sparking plug cracked; it was Italian too. But the tin flag of the first post of French gendarmes consoled me for the swindling I had suffered at the so-called Italian hospice, and Italy was behind, and I plunged rather recklessly down to Landisbourg, and then on to Modane, down mostly, first easily enough for me to hold in the machine, for never a spark would come from the cracked plug. The scenery was fine, and the forts imposing, and the rain abominable, and I saw the railway dive into the tunnel. But I was a good deal more pleased to see the big hotel opposite the Modane Station. And so ended that day, and Mont Cenis was crossed.

THE RETURN THROUGH FRANCE.

From the moment I entered France everyone had been charming, but totally unable to supply me with new parts to replace the broken ones. At the summit I was told I should find everything at Landisbourg, but there they were desolated at having to advise me to go on to Modane, whence I was recommended to some other place. But I soon saw I must either fix the machine myself, or train or pedal to Chambéry. I managed to fix it. But if the road had not been all down hill for some 60 miles I am afraid I should have had to give up. As it was, I pedaled into Chambéry and loaded myself down with batteries. It wasn't altogether a permanent success, however. For a man on a motor tricycle beat me all to pieces that afternoon, and finally I found myself sitting on the stone parapet in the "Gorge de Fer" admitting to myself and nature that I was

a fool ever to have bothered about motor bicycles. But I cooled off, and the road still was down hill, and there was a café, and the scenery was magnificent, and I eventually came out again on the Rhone, which I had left earlier in the day, and then got into Seyssel, welcomed by the Virgin high above the bridge spanning the rapid river. I cannot, however, forget the horror of the day. The road by the lake of Annecy was beautiful, but the machine only went by fits and starts. Then I broke the taps and lost my tools, and finally missed my way, and climbed miles up a pass only to come down again. But I got to Seyssel somehow. The next day I went on to Bellegarde and met the Rhone again. The roads were fearful, and all the afternoon I crossed mountains and mountains, sometimes going like a streak and sometimes like a snail. I skirted lakes and climbed and coasted mountains, and came out on the top of a town hundreds of feet below me, so near underneath that I might have thrown things onto the roofs. Finally I reached Bourg, by the wonderful church at Brou, and the machine was so tired that a little soldier on a bicycle beat me into the town.

The next day there were troubles all the way to Macon, and in the afternoon, between that town and Nevers, I crossed a series of table lands connected by hills that would put Devonshire and Cornwall to shame. I did not mean to stop at Nevers, but the repair man, with whom I had passed so many hours going out, saw me and wanted to hear all about it. And the landlord of the Hôtel de France was so cordial that I had to stay over till the next day.

In the morning it was raining, with a head wind. But before long the sun came out and dried the roads, and the good highway fled away under me, and the wind roared in my ears. Soon I was in Gien, and the Loire had gone back to its bed, though it was colder than when I rode out; and then Orléans came in sight, and down poured the rain as usual, keeping me there till nearly 6. But I got to Chartres while dinner was still on the table, 72 kilometres, or 45 miles in about two hours. This was my longest day's ride: over 200 miles.

I was called at 5 the next morning, and got off a little after. The machine started all right, but for half an hour I could not find the road to Rouen, and when I did find the track, a narrow old alley, the machine wouldn't budge. For five mortal hours I tinkered at it. And then—it went—for a little while, to Dreux, where I found a repairer. Then the machine went again for a mile or so, and broke down in the pouring rain. However, I found a friend, and for three hours we worked at it. When it did go it wouldn't travel at more than 10 miles an hour. Slowly and solemnly I plodded on. Traps passed me, cyclers rushed by, and then, all of a sudden, it went off like a mad thing and tore magnificently into Evreux, leaving a motor tricycle as though it were standing still. What was the matter all day? I don't know, and I have yet to find someone who does. I had made about 50 kilometres, 45 of them in thirteen hours and fifty minutes, the last five in ten minutes, and I had to hold the thing in hard down the hill and over the vile pavement of Evreux. That day's work for repairs cost me 25 francs. It was a record. But every one welcomed me like the returned prodigal, and wished me good luck the next day; and then, all the way through the lovely Norman roads to Pont-au-de-Mer, and over the ferry to Lillebourne, the same slow pace was kept, and it was not till the hour of sunset, though I had done 100 kilometres, that, in the streets of Harfleur, it started again, and tore—while it was all I could do to hang on—to the docks at Havre. That was the end. No one can find out what imp is in that demon motor.

And what good was it—this tearing over Europe? Well, I know that, even imperfect, clumsy, crude and ridiculous as in a very few years we shall think the motor bicycle of today, it is as much an advance on the pedal shoved safety as that was over the bone shaker. After a long tour on a safety you come back fit, but tired. On a motor bicycle you have had no exercise, the wise ones tell you. What is exercise? Twirling your legs? Why, then, are horses recommended? Bosh! Exercise is getting out of your rut into the sun, the wind, the rain and mud, forgetting your shop and making things hum. And there is nothing in the world like the motor bicycle for it. What is Alpine climbing? Struggling over difficulties, with a pretense of scientific and artistic kudos at the end. There is really no kudos, for the hard work is done by the guides.

And who, after a tour like mine, would ever return to pedaling the common bicycle? I for one would not. As for the automobile, it does not interest me—at least for touring. But the motor bicycle gives more pleasure, more exercise and more honest toil and more misery than I have ever experienced in any other way in my life. And as soon as it becomes fashionable the world will find out that a new joy has been added to the moment.—*London Chronicle.*

A curiosity has been discovered in Norwich, England. It is nothing less than a one cycle motor which we are informed gives power with every stroke of the piston, all the length of the stroke in both directions. After this we are not surprised to learn that the engine starts itself, and that the carburetor makes enormous quantities of explosive mixture, even from ordinary paraffin oil. The discovery in Norwich of a triangle with only one side and of a round square may doubtless be expected before long, says the *Automotor Journal.*

New Dust Protection D

A simple dust shield for autor been devised by an English fir ing of a light frame attached t of the car by arms, which are l ted so that they project from t the vehicle at a suitable angle. canvas or other suitable materi across from one arm to the constituting the screen proper, vents the dust rising and enve car. Means are provided for al occupants to get in and out of without disturbing the shield central roller blind admitting c cess to a tonneau body.

The Ivel Agricultural

We referred in a recent issue tor vehicle for agricultural pu "Ivel," built in England. The plement is an 8 horse power, do der gasoline motor with water c it has electric ignition, one spe and reverse, and with a few le one of ordinary intelligence ca drive it. The engine is free, put in motion a friction clutch the power through an interme to the balance gear shaft of wheels, by means of patent sile chains. To the wheels, which l wide rims, with "grips" to pre ding, detachable rubber pads be placed, by means of thumb traveling on the high road, an vibration is lessened and the abled to run more easily. Th fuel, etc., is said to be very sm come out considerably below horse labor. The vehicle has signed chiefly for the use of far in addition to its being a porta it is constructed so as to dra mowers, and other implements nature, while almost any agricu chine can be attached to it in a utes. The connection is formed tor spring coupling between and a short pole, and from all a most satisfactory results can be In addition to the uses it can b the fields, its capabilities at varied, for among other things utilized for cutting chaff, pulp grinding corn, and the varied l tions which go to make up the d of toil on a farm, while also it easily convey to and fro loads o other things. One day last large company of farmers w trial of the machine in drawing The motor for over an hour round and round at the rate miles an hour, drawing a mowe grass was clean cut to the ger faction of all.

Marseilles is said to be the s as to the number of automobil in France, as 686 permits for dr been issued by the authorities.

The Boston and Amesbury Gasoline Carriage.

NEW VEHICLES AND PARTS.

The Boston and Amesbury Manufacturing Company's Vehicles.

The Boston and Amesbury Manufacturing Company has recently been incorporated in New Jersey with a capital stock of $250,000 to manufacture automobiles. The officers of the company are H. A. Spiller, Dorchester, president; John Miller, Amesbury, treasurer; Robert G. Patten, Amesbury, secretary. The company propose building gasoline carriages in three styles, a two cylinder 4x4 inches, 8 horse power; a two cylinder 5x5 inches, 12 horse power, and a four cylinder 4x4, 16 horse power. The smaller size is herewith illustrated. Everything will be manufactured in the company's own shops except the Baldwin chains and the International Endurance tires. No factory location has been decided upon as yet.

Neustadt-Perry Rear Axle Brakes.

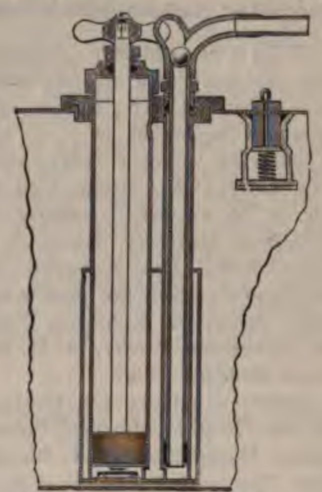
The Neustadt-Perry Company, of St. Louis, Mo., have just gotten out in connection with their artillery pattern wood wheels, driving sprockets and castings for double acting band brakes to accommodate a sleeve in connection with the stiff rear axle. The brake is a double acting band brake made on the eccentric principle and is furnished, together with levers and all necessary attachments for operation in connection with the above wheels.

The "Auto" Safety Gasoline Can.

We herewith illustrate the "Auto" safety gasoline can now being marketed by X. Stoutenborough, of 277 Pearl street, New York. Mr. Stoutenborough informs us that it has been approved by the New York Board of Fire Underwriters as meeting their requirements, and furnishes the following information about the can:

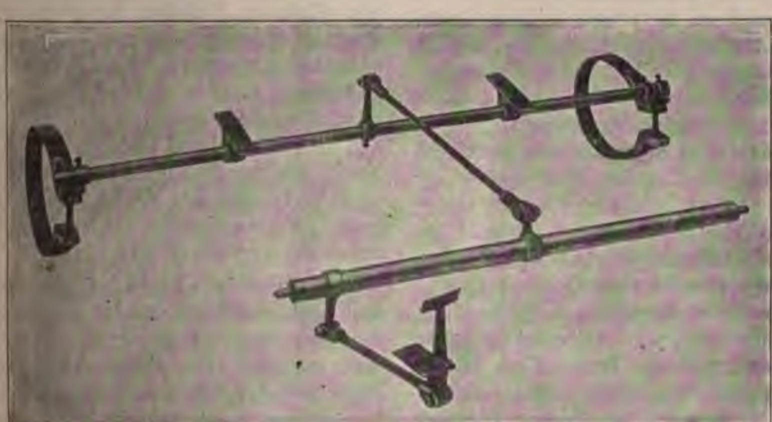
The "Auto" Safety Can.

This can is provided with a sunken cup in its cap portion, into which the liquid is



Sectional View of Can.

poured in filling it. This cup contains a valve that is normally spring held to its



Neustadt-Perry Brake Mechanism.

N.-P. Wheel with Sprocket and Brake Drum.

seat, effecting a tight closure and preventing evaporation.

By the aid of a rod the valve is opened against the spring pressure, the rod being engaged in an eyelet to retain the open position while filling.

The fluid is withdrawn from the tank by a pump action, the discharge nozzle being of novel form, in that a ball valve is seated near its upper end to normally close the exit and prevent the escape of vapor, the ball becoming automatically unseated with the pumping operation, and passing into a closed channel, thereby freeing the fluid exit and permitting gasoline to flow through the nozzle.

This device is claimed to answer the requirements for a convenient and safe gasoline tank. In addition to the form shown in the cuts, it is made in larger sizes, of rectangular form.

Worcester Automobile Club.

The Worcester (Mass.) Automobile Club was organized at a meeting of automobile owners at 11 Foster street, Worcester, on September 29.

The following officers were elected: President, George B. Cutting; vice president, Dr. R. M. Garfield; treasurer, John A. Harrington; secretary, Harry E. Shiland; chief marshal, Fred S. Taylor; board of governors, Dr. Garfield, chairman; F. S. Taylor, Birney A. Robinson, Thomas J. Toner, Alexander Fowler, O. M. Savels and Frank Goddard.

The charter members are George B. Cutting, Dr. Roy M. Garfield, John A. Harrington, Harry E. Shiland, Birney A. Robinson, Thomas J. Toner, Fred S. Taylor, Frank Goddard, Alexander Bowler, John A. Rhodes, Roscoe G. Bicknell, John W. Higgins, O. M. Savels and Frank H. Hamblin.

Toledo (Ohio) Automobile Club.

The Toledo Automobile Club was formally organized on September 27 and the following officers were elected: Dr. L. A. Liffring, president; Dr. C. P. Wagar, vice president, and George A. Palmer, secretary and treasurer. The committees named were: Membership—Charles A. Hall, V. M. Falardeau, George R. Troutt, J. N. Bick, J. M. Foutz. Exhibitions, touring and routes—Guy R. Ford, George R. Troutt, George R. Ford. Auditing—Grant Williams, F. J. Langraff, Jr., Frank Hake.

The trustees are Frank Hake, George A. Palmer, J. N. Bick, Ezra E. Kirk, George R. Ford, J. M. Foutz, Dr. C. P. Wagar. The trustees organized by electing Ezra E. Kirk chairman and George D. Palmer secretary.

It was decided to give a race meeting at the fair grounds this fall. Constitution and bylaws were adopted. Another meeting was to be held Saturday, October 4, at the office of the secretary.

MINOR MENTION

A feature of the Rome (N. Y.) Fair was a series of automobile races.

F. Harloff, 310 State street, Madison, Wis., has taken the local agency for the locomobile.

C. F. Wright, of Richmond, Ind., is seeking to establish an automobile factory at Muncie, Ind.

A California automobilist recently made a tour from Seattle, Wash., to Redding, Cal., 631 miles.

Windsor T. White is said to favor the abolishment of classification by motive power in races.

The St. Louis Automobile Club had a club run on September 28 in which eleven automobilists participated.

Owing to rain on September 30 the Detroit races were postponed and the new date has been fixed for October 24.

The Searchmont Land Company is being organized to build houses at Trainer for the workmen of the Fournier-Searchmont Automobile Company.

The Buffalo Automobile Club is said to have under consideration the erection of a permanent home, to be completed next year.

F. H. Wilson, who has had the Oldsmobile agency at Toledo, Ohio, for some time, has sold out his business to the Toledo Motor Carriage Company.

Winthrop E. Scarritt, whose name has been mentioned in connection with the presidency of the A. C. A., has given out a statement that he would not accept the nomination.

The Cannon steam racer, which made new world's records at Providence, R. I., recently, is equipped with a 24 inch boiler made by the Steam Carriage Boiler Company, of Oswego, N. Y.

Mohler & De Gress have moved to 390 Webster avenue, Long Island City, where they have more spacious quarters and better facilities for the manufacture of automobiles, motors and parts.

The board of governors of the Automobile Club of America decided, at its meeting on Tuesday, to petition the proper authorities to stop the flooding of Fifth avenue by the sprinkling wagons.

The proprietors of the leading hotels of Washington, D. C., have been notified by the Washington Electric Vehicle Company that the operation of automobiles between the railroad depots and the hotels will be discontinued after October 1.

The Eureka Automobile Company has been incorporated with principal office at 1 Montgomery street, Jersey City, N. J.; object, manufacture automobiles; capital, $400,000. Incorporators: Nathan Metzenbaum, 11 Woodland court, Cleveland, Ohio; Eugene W. Schneider, 600 Leonard street, Brooklyn, N. Y., and Clatonia J. Dorticos, 58 West 109th street, New York city.

The Dayton Automobile Club held a meeting September 30 and decided to hold an automobile race meet at the fair grounds on the afternoon of Saturday, October 18.

At New Haven, Conn., preliminary steps have been taken to form an automobile club by Yale students. About twenty-five students own machines. It is intended to maintain a storage and repair station.

A company is preparing to manufacture automobiles at Whitneys Point, N. Y. The machines to be built are said to be good substantial road wagons with a speed of about 20 miles an hour, weight about 900 pounds and cost $700.

The State highway commissioners of Massachusetts were so much pleased by the recent automobile trip through a section of the State that they propose to make their last tour of the season, through the Cape Cod district, in this way.

The following officers were elected by the Council Bluffs (Ia.) Automobile Club on September 25: President, M. Wollman; vice president, H. H. Van Brunt; secretary and treasurer, T. S. Farnsworth; board of directors, Dr. T. B. Lacey, L. A. Casper, W. H. Kimball; inspector, L. P. Madsen.

According to a cablegram Messrs. Lehwess and Cudell with the Passe Partout have arrived at the Russian capital. From Warsaw they had a most adventurous run, having taken a wrong turn and spent two days toiling over plowed fields. The vehicle had often to be pulled out of the mud by villagers with teams of horses.

The Post Office Department has informed the post office at Rock Island, Ill., that proposals are invited for carrying the mail in screen wagons at Rock Island from July 1, 1903, to June 30, 1907. The department adds that an automobile service will be considered if desired and evidently looks upon it with favor. A bond of $4,000 is required. The present compensation is $1,580 a year.

A demonstration in the interest of good roads was made by the Chicago Automobile Club on October 2. More than a dozen of the largest machines in the city, including a number of racers, paraded the downtown district, headed by President F. C. Donald. The club had as it guest Mr. and Mrs. L. C. Boardman, of New York, who made the trip from that metropolis to Chicago several days ago to make an investigation of the roads between the two cities.

State Highway Commissioner McClintock, who recently made an inspection tour per automobile, says: "Our whole trip, including the charges for the machine and for hotels, cost inside of $75. If we had used horses, the numerous teams we should have had to hire and the greater amount of travel by railroad, and

the fact that nine, instead of three days, would have been required, would have made the tour cost well toward $200."

The Goodson Electric Ignition Company was incorporated at Providence, R. I., on September 29, with $10,000 capital stock.

A motor cycle show is said to be in contemplation by the New York Motor Cycle Club, to be held in New York city during the coming winter.

No. 9, a Pope-Robinson touring car, has been withdrawn from the Endurance Contest owing to the company's inability to complete the machine in time.

In the issue of October 1 the wheel base of the "Northern" gasoline carriage was said to be 10 feet 9 inches. This is a typographical error, the actual dimension being 5 feet 8 inches.

Messrs. Henry E. Greene and Harry T. Warnicke, of Amsterdam, N. Y., are having their Oldsmobiles refitted with 8 horse power Brennan motors to enable them to climb the steep grades surrounding that city.

Charles E. Miller has just received a large shipment of French horns, one type of which is provided with 40 inches of flexible metallic tubing, a special bracket for attachment to steering lever and a sieve over the opening to keep out dust and dirt.

Automobilists will be glad to hear that a macadam road is being constructed from Amsterdam, N. Y., to the summit of Tribes Hill. This hill was one of the terrors of the New York-Buffalo Endurance Run and formerly had a maximum grade of 16 per cent., which is now being reduced to about 10 per cent. This will give about 8 miles of good road which will be much welcomed by the local devotees and tourists.

In an automobile hill climbing contest at Chauteau Thierry M. Gabriel with a Mors went up a kilometre grade in 1 2-5s., and M. Love, on a tricycle, in 49 1-5s. The grade varies from 5 to 10 per cent. M. Rigolly, with a Gobron, was first in the light class of automobiles, and M. Baras, with a Darracq, second. M. Serpollet had an accident on his way to the scene, but managed to finish second to M. Gabriel's first in the heavy class.

The Western Motor Company, a consolidation of the Rutenber Manufacturing Company and the Logansport Foundry Company, both of Logansport, Ind., filed articles of incorporation September 30 Capital stock, $400,000. The articles state that the Rutenber Company and the Logansport Foundry Company each received $125,000 from the new organization. The company will manufacture gasoline engines. The articles were filed by Senator Eben H. Wolcott. The directors are Robert Parker, E. A. Rutenber, F. B. Wilkinson, E. H. Wolcott, J. F. Digan, G. E. Kessi, George W. Funk.

Legislative and Legal.

The Joliet (Ill.) automobile races were postponed owing to rain.

Walthour, the bicycle racer, was arrested recently at Atlanta, Ga., for driving his automobile on the sidewalk.

There is said to have been an increase in the number of arrests for speeding in and around Philadelphia recently.

The board of city trustees of Alameda, Cal., at its next meeting will take steps to regulate the speed of automobiles.

At Lansing, Mich., an automobile ordinance will be introduced in the city council by Alderman Dodge at the next session of that body.

Lawyer Fred Basom was the first to come in conflict with the new automobile ordinance in Joplin, Mo., being arrested for speeding on Sunday, September 28.

The Horse Thief Detective Association, of Montgomery County, Ind., at their recent meeting demanded the passage of laws regulating the speed of automobiles.

The Battle Creek, Mich., city council has passed an ordinance limiting the speed of automobiles to 6 miles an hour on all paved streets and to 12 miles an hour in other parts of the city.

The public safety committee of Pittsburg on September 26 affirmatively recommended an ordinance limiting the speed of automobiles to 6 miles an hour in the business portion of the city and 10 miles an hour elsewhere.

The mayor of Savannah, Ga., on September 26 issued an order to the police department, in which he instructed them to place on the information docket all automobilists who drive their machines faster than 8 miles an hour.

John C. Orr, a well known financier of New York, was arrested for furious driving at Babylon, L. I., on September 29. The judge fixed the fine at $25, but Orr objected on the ground that it was too high and announced his determination to fight the case.

Alderman Cameron, chairman of the ordinance committee of the Davenport, Ia., city council, reports that the committee has considered the automobile ordinance and will be ready to report on it at the next council meeting. The ordinance will regulate the speed of the automobiles, provide that they have lights, bell, etc.

The city fathers of Kansas City are working on an automobile ordinance and some absurd recommendations have been made. For instance, it is proposed that steam carriage drivers shall take out steam engineers' licenses and electric vehicle operators be required to pass an examination in electricity. We would call the council's attention to the fact that nowhere in the world—not even in the largest cities, where there are hundreds of steam carriages in use—are the drivers thereof required to take out an engineer's license. The council should be content to insure that drivers know how to properly guide and stop their machines, if it wants to prevent automobiles being operated by unskilled persons.

In Brooklyn Commissioner of Public Safety Listman has drawn the attention of the police department to the provisions of the automobile law and requested its enforcement.

Henry L. Blum and his chauffeur have been indicted by the Bergen County (N. J.) grand jury as being a nuisance, having run an automobile at unlawful speed and caused a horse runaway which resulted fatally.

At Chicago Vernon Cassard, automobilist, was cleared of all blame September 26 by a coroner's jury, which investigated the killing of Minnie Brouckman by Cassard's machine. The evidence tended to show that the automobile was running slowly when the child was struck in Fifty-fifth street boulevard.

From Newark, N. J., it is reported that the question as to which ordinance, that of the Essex County freeholders, limiting the speed of automobiles to 20 miles an hour, or that of the township committee, where the rate of speed is fixed at 8 miles, should be operative in the township, has been settled by an opinion received by the township committee from their counsel, Lawyer Riker, of Newark, who informed the committee that the freeholders had no right to pass an ordinance that would be operative if it conflicted with one already in operation in the township.

The Proposed New York Licensing Ordinance.

Following are some extracts from the ordinance requiring automobile drivers to be licensed which has been introduced in the New York city council at the instance of the L. A. W.:

No person shall hereafter operate any automobile, locomobile, motor vehicle or other similar vehicle, whether the motive power thereof be electricity, steam, gas, gasoline, oil, naphtha or other similar source of energy, and whether used as public hack, truck or for hire, or for private pleasure or business, until such person has first obtained a license to operate the same.

Licenses issued hereunder shall contain the name and address of the person in whose favor issued, the kind of vehicle to be operated thereunder, with a sufficiently definite description thereof, and shall otherwise be in such form as may be prescribed by the said board of examiners of automobile operators, and shall be numbered and registered by and with the bureau of licenses with the full name and address of the person to whom issued, with the number thereof, in a book to be provided for that purpose, which book shall be open to inspection by the public during office hours. Every person to whom any license is issued, before attempting to operate any such vehicle

thereunder, shall cause the vehicle mentioned therein to be equipped with two suitable lamps, to be approved by the mayor or by the chief of said bureau of licenses, one to be carried forward on each side of such vehicle, and shall have securely fastened across the middle of the outside of each lamp a metal band not less than two inches in width, out of which the official numbers of such licenses shall be cut after the manner of a stencil plate. The component figures of such numbers shall not be less than 1½ inches in height, and of a style to be approved by the mayor or by the chief of the said bureau of licenses, and said number shall be so placed as to be easily seen from either side of such vehicle by day as well as by night, and such lamps shall be kept brightly burning from one hour after sunset as long as said vehicle is used at night.

It shall be sufficient cause for suspending or revoking such license that the person to whom it has been issued has violated any law, ordinance, regulation or resolution of said city or any department thereof in regard to the rate of speed at which such vehicles as are affected by this ordinance are permitted to be operated or run; or has wilfully violated any other law, ordinance, regulation or resolution of said city or any department thereof, or any law of the State of New York operative in said city, etc.

The fee to be paid for licenses under this ordinance shall be as follows: For any vehicle affected by the provision hereof operated as a public hack, cab, coach or truck, or for hire, if intended to carry one or two persons, $3; if intended to carry more than two persons, $5. For any such vehicle operated for privae use, either for business or pleasure, $10.

Any person operating or attempting to operate any vehicle, covered by the provisions of this ordinance, on any of the streets, avenues, roads, alleys, lanes, boulevards, highways, concourses, parks, parkways or other public places within said city of New York without first obtaining a license so to do, or violating any of the other provisions or requirements of this ordinance, shall for each offense be fined not less than $10 nor more than $50, or shall be imprisoned not less than two days nor more than ten days, or shall suffer both fine and imprisonment.

Nothing herein contained shall be construed to apply to any vehicle propelled by horse power or by human agency, nor to any street car, by whatever motive power propelled, nor to any elevated or steam railroad or railway car or engine or other motive power used to propel the same; nor to any vehicle mentioned in Section 1 hereof, owned or employed by the city of New York or by the Government of the United States, or by any regularly constituted hospital in said city of New York.

This ordinance was introduced to the law committee of the board of aldermen on September 4 by Joseph B. Thompson, who is chairman of the rights and privileges committee of the New York State Division, League of American Wheelmen. He was requested by the executive committee of the division to prepare an ordinance of this sort. Just what prompted the League of Wheelmen to take this step, which can only be interpreted as directed against the automobilists, is not quite clear, unless it be that decadent organizations, the same as decadent individuals, take delight in obstructing the progress of others. While some form of licensing automobile drivers is not at all objected to among prominent automobilists, the general opinion is that this matter should be regulated by State laws and not by municipal ordinances; and, furthermore, the ordinance introduced in the New York council has many defects. For instance, the first section quoted above would preclude any visitor from entering the city with an automobile without obtaining a license and that nothing following makes an exception in favor of transients. Section 2 provides for the appointment by the mayor of a commission of three to examine applicants as to their competency. The commissioners are to be paid out of the fees obtained for licenses and are to have a secretary who is already a city employee. The commissioners may be removed at the pleasure of the mayor. "Said board may adopt and enforce such rules and regulations for the performance of the duties imposed upon it as it shall deem necessary." It is questioned whether this leaves it open to the commissioners to make exceptions of the kind mentioned.

The section giving the mayor the right to revoke licenses is also objected to, and the requirement that the machine shall not be left in the street unattended is certainly unreasonable.

Automobile Case to Go to Supreme Court.

Herman Unger, a Newark (N. J.) merchant, was arrested recently by a Scotch Plains constable for driving his automobile over the streets of Fanwood Township at a speed greater than 10 miles an hour. Mr. Unger is going to fight the case, and the Supreme Court of New Jersey is going to decide whether a municipality has a right to make laws singling out automobiles from other kinds of vehicles and fix a special limit for their speed. Mr. Unger was to appear before Justice Clark, of Scotch Plains, a few days ago, to answer to the charge, but his attorneys, Reed & Coddington, obtained a writ of certiorari from the Supreme Court which will temporarily halt the proceedings.

This writ requires the township authorities to send up to the Supreme Court the ordinance and all the proceedings relative to the passage of the ordinance pertaining to the speed of autos. These
viewed by the Supreme Court
ing called, when both sides w
opportunity to argue their poi
while, the proceedings in Just
court are at a standstill and
so until a decision is given as
stitutionality of the ordinance.

"We claim," said Mr. C
counsel for Mr. Unger, "that
nance is defective and void i
cause it discriminates between
of automobiles and other vel
also claim that the ordinance i
tion of private rights of person
on the public highway and tha
nance is unauthorized by the
act."

This case promises to attract
tention throughout the State,
first time that a legal fight has
on the constitutionality of the
nances which affect automobil
other vehicles. There is no pr
the case, except the ruling as t
and the decision of the Suprem
the case will naturally affect th
dinances on the subject throu
State.

Automobiles at Country

The Brockton (Mass.) Agric
ciety have declared against a
At their annual fair, held Septe
October 3, they refused to allo
the grounds, except in a pen,
had built in one corner of the
A special gate led into this p
who visited the fair, unable t
grand stand tickets and who cam
idea of viewing the fair from t
their autos were thus debarred
privilege and greatly disappoin
by. The Brockton Automob
through their entertainment
did all in their power to induc
management to change their de
they refused to do so, claiming t
might be scared. Add to this
that advertising autos, whose ov
for the privilege were allowed
the grounds at will, and it sets
dering whether a horse which
ened at the sight of an automob
to discern the difference between
for business and one on pleasur

At the Taunton Fair, Septem
automobile meet was held, sixty
taking part in the parade aroun
and the track at the groun
were no runaways; in fact, no
was seen which was in the least
It is hoped that another year t
ton Fair management may be i
change their decision in regard
and instead of discriminatin
them will throw out inducement
to attend and enjoy themselves.

Automobile races are a very g
ture at country fairs the presen
seem to be appreciated.

Automobile Accidents.

At Chicago, Ill., a country woman was run over by an automobile delivery wagon at the corner of Fifth avenue and Harrison streets last week. The accident ended fatally. The victim was confused by the vogue of traffic at the scene of the accident.

The steering gear of an auto driven by Fred Lang, of Rochester, N. Y., on September 26, got out of order and the machine swerved and struck the curb, throwing the occupants, Mr. and Mrs. Lang, out. Mrs. Lang was seriously bruised.

At Manchester, St. Louis County, Mo., Samuel Primm, of Belleville, had a narrow escape on September 28. It is stated that when he was near the top of a hill his steam pressure gave out, which caused him to stop, and when he started again the reverse lever automatically reversed and he started down hill at a considerable speed. One of the occupants jumped and the other was thrown out; neither was seriously injured.

Bicyclists and the Automobile.

Automobilists have frequently been annoyed and bicyclists hurt by the latter's habit of "hanging on" to the automobile in the street. It seems opportune, writes an automobile owner, to sound a warning for the benefit of the inquisitive cyclist, usually a small boy, who makes a practice of riding for miles alongside the horseless carriage, to the great embarrassment of the driver of the vehicle. The rider of the two wheeled machine, often absorbed in the contemplation of the revolving machinery, does not appear to realize that an automobile can turn much more sharply than he can, and when a turn is made the bicyclist cannot help running into the vehicle. After having had a number of narrow escapes from being run down by bicyclists, the writer actually had a collision of this kind, fortunately with no more serious result than a bent pedal pin on the bicycle.

Another fruitful source of accident to wheelmen is the practice of using motor carriages as wind shields. An automobile can stop much more quickly than either a bicycle or a horse drawn vehicle, and a sudden stop on the part of a horseless carriage has not infrequently led to an accident to a bicycle following immediately behind the carriage.

Trade Literature Received.

Searchmont Gasoline Cars.—The Fournier-Searchmont Automobile Company, of Philadelphia. (North American Building).

Rambler Automobiles.—Thomas B. Jeffery & Co., of Kenosha, Wis.

Automobile Parts.—A. L. Dyke, Linmar Building, St. Louis.

Kerosene Number, May 28, 10 cents.

The Renault Double Cylinder Motors.

Until the present year the Renault Brothers in their voiturettes used the De Dion motors, but the machine which was first in the Paris-Vienna race was equipped with a four cylinder motor of their own construction. The regular Renault cars are equipped with two cylinder motors, and one of these was seen recently at the establishment of Smith & Mabley, where the following information was gathered about the motor.

The Renault 15 horse power double cylinder motor resembles the De Dion double cylinder engine in many respects. Each cylinder is cast separately, but integral with its head. The cranks are set at 180 degrees and have no bearing between them. The valves of each cylinder are in line with each other. The admission valves are not operated by mechanism, but are controlled by suction on the suction stroke and closed by coiled springs at the moment that the pistons begin to compress the charge. The spark plugs are located between the valves, as in the De Dion motors. To remove the admission valves it is only necessary to loosen two nuts, one to each valve, then turn the yoke 90 degrees and lift out the cage.

The cam shaft is parallel to the crank shaft. It is driven by a countershaft that has a helical gear at each end and which is in turn driven by the crank shaft. The contact breaker is mounted on the extension of the countershaft and its cam, therefore, revolves in a plane at right angles to the plane in which all the other cams and the flywheel revolve. The cylinders and heads are water jacketed and the pistons, connecting rods and the journals are lubricated by splash. The crank case is a dust and oil proof aluminoid casting. Each admission valve has its individual inlet pipe and carburetor. The exhaust pipes are not united and terminate in separate mufflers. The flywheel is dished to receive a conical friction clutch. The speed of the engine is about 1,500 revolutions per minute normally.

Alloys of Aluminium.

A paper by Prof. E. Wilson on "Alloys of Aluminium" was read by the author at the recent meeting of the British Association. Specimens of alloys had been placed on the roof of King's College, London, in order to investigate the effect of exposure to London atmosphere. The specimens were in the form of wire 0.126 inch in diameter. They were tested after about thirteen months' exposure. The percentages of variation of specific resistance varied somewhat widely in accordance with the conditions. Corrosion increased with the percentage of copper. Nickel alloyed with copper had the effect of slightly increasing conductivity during exposure. Iron also in the presence of nickel slightly increased conductivity. The author stated that since the specimens were supplied the purity of commercial aluminium had greatly improved. The conclusion reached, however, was that for light aluminium alloys it appeared that copper alone should not be used in the alloy. The presence of equal amounts (about 1 per cent.) of nickel and copper certainly reduced conductivity to a small extent, but the gain in mechanical and corrosive properties was great.

Professor Glazebrook questions how far the results obtained might be influenced by deep pittings or cracks in the wire. The results noted in regard to the combination of nickel and copper were very interesting, but were not what might have been expected.

Sir William Preece considered that aluminium was destined to play an important part in electrical works on account of its lightness. He had found that when aluminium wires broke they gave way at points where impurities existed, and for that reason it was satisfactory to find new processes had increased the purity of the metal.

American Generals in English Police Traps.

Generals Corbin and Young and John W. Gates, says a report from London, have had experiences of the rigor of English motoring laws. Both on Saturday and Sunday they were driving a car which was stopped by the police, who summoned the Americans for exceeding 12 miles an hour. The car in each instance was a fast, new vehicle, just purchased by Sir Thomas Lipton, who had lent it to Mr. Gates to show the generals around the country.

On Saturday the party was driving through Windsor when a policeman arrested the chauffeur and took the names and addresses of Mr. Gates and General Young, who were the occupants of the car, and Sunday the same party, with General Corbin, was nearing Brighton, when a policeman stepped out of a hedge and stopped the car.

When the summonses are called up no defense will be made, for, as one of the Americans said, "The police have got you at their mercy. You may be morally sure that you were not driving at over the speed limit, but that is ineffective against the police, with their stop watches."

Sir Thomas Lipton says that as he was not present he could not say anything regarding the merits of the case. He was rather amused at the American generals joining the category of the automobilists who had fallen foul of the police and among whom are many distinguished persons, including Premier Balfour.

An automobile 'bus line is now in operation between Madrid and Miraflores, Spain, a distance of about 32 miles. The service comprises five steam omnibuses, seating fifteen passengers each.

MOTOR VEHICLE PATENTS..

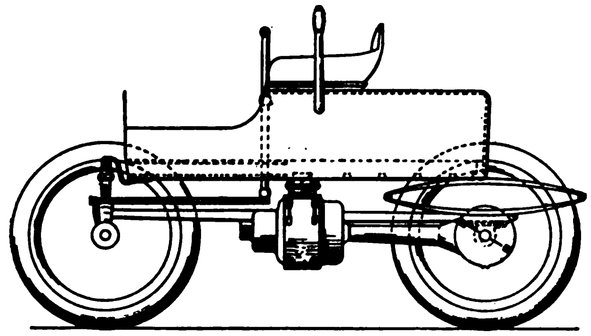
United States Patents.

709,859. Motor Vehicle.—Walter C. Baker, of Cleveland, Ohio. September 30, 1902. Filed February 14, 1902.

In an electric carriage the motor is supported and braced directly from the rear axle by means of a casing which forms the journals for the rear axle and the casing for the transmitting gearing, the whole being braced in such a manner as to prevent any lateral movement of the motor and its connecting mechanism in relation to the rear axle, thus keeping all the parts in alignment and at the same time allowing the free vertical movement of the motor without disaligning or cramping the parts.

The motor is supported from the vehicle frame as follows: A stanchion bar is securely fastened to the body and has secured to it at both sides rocking bars pivotally secured at their central portions to the stanchion bar and hence adapted to rock in relation to the stanchion bar and the vehicle body. At the ends of the rocking bars are pivotally secured hangers, which are in turn secured pivotally to the motor casing, thus allowing the motor casing to be supported in its vertical position in relation to the rear axle and traction mechanism without being affected by the motion of the body of the vehicle.

Interposed between the stanchion and the motor casing is a compressible substance, the purpose of which is to cushion or insulate pounding or jerking between motor and body.

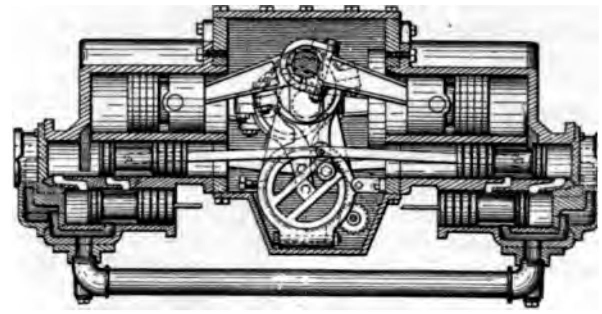


No. 709,859.

709,949. Valve Gear.—Paul H. White, of Indianapolis, Ind. September 30, 1902. Filed October 3, 1901.

The invention relates to an improvement in reversing gears for single acting steam engines.

Formed integral with the crank shaft are two eccentrics, upon which are mounted eccentric straps provided with substantially radial arms, termed "eccentric arms." Arranged adjacent to the crank shaft is a circular track, in which is revolubly mounted a circular plate, provided upon its periphery with a series of gear teeth, which are adapted to mesh with a pinion, as plainly seen in the drawing. The shaft of this pinion is provided with a sprocket wheel, so that it may be rotated from a distance by means of a chain. The plate is provided with a diametrical slot, within which are mounted two slide blocks, the blocks being in length each a little less than half the thickness of the plate in order that they may both lie in the slot in such manner that each may pass the other. The free ends of the eccentric arms are pivotally attached to the slide blocks.



No. 709,949.

The two links for operating each set of valves (high pressure and low pressure) are connected at the middle of one of the two eccentric arms respectively. The points of cut off and the direction of motion of the crank shaft may be regulated by a rotation of plate in the circular guide by means of a pinion, such rotation changing the angle of the slot in the plate with relation to the crank shaft, and thus varying the direction of the eccentric arms and the links connected thereto.

710,087. Feed Controlling Mechanism for Hydrocarbon Motors.—W. W. Tuck, of Richmond Hill, and August Wassmann, of Astoria, N. Y.

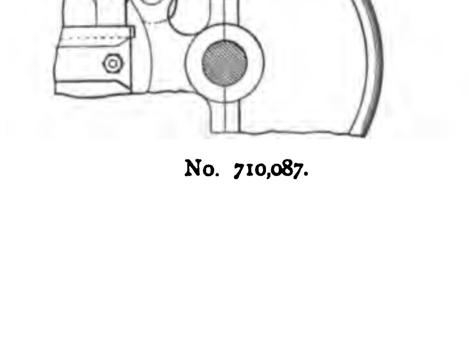
This invention provides means for mechanically injecting the gasoline into the engine and controlling the feed. At the right of the drawing is shown a gasoline pump, which communicates with the fuel supply tank through pipe. A follower rests loosely upon the end of the pump rod, being held and maintained in positio
bracket, through which it passes.

Above the pump at the end of
of a rocking lever there is an a
vertical rod formed with a contact
its lower end. The rocking leve
crumed upon a stud upon an ecce
which the lower one of the two ha
is fastened on the opposide side. A
the fulcrum of the rocking lever m
justed within certain limits with re
the centre of the cam shaft, thereby
the stroke of the contact point. A c
secured to a stationary part of t
and to the inner arm of the rocki
tends constantly to throw the out
upward against a suitable stop.

A controlling slide is pivoted at
end to the lower arm of the rock
The other arm carries a roller.
spring secured to this arm at one
ity tends constantly to throw the l
of the downwardly extending a
contact with a stop. A flat met
is secured to the under side of
trolling slide and extends backw
a stud, so that it tends constantly
the controlling slide downward ag
upper end of the follower. The c
slide is formed with a recess upon
side, into which the contact poi
when the slide is drawn inward s
for the purpose of cutting off the o

Upon the same stationary sh
which the lever M is mounted is
crumed the hand lever P, the sho
of which carries the roller for co
the roller upon the inner end of
M when it is desired to adjust the
ling slide by hand.

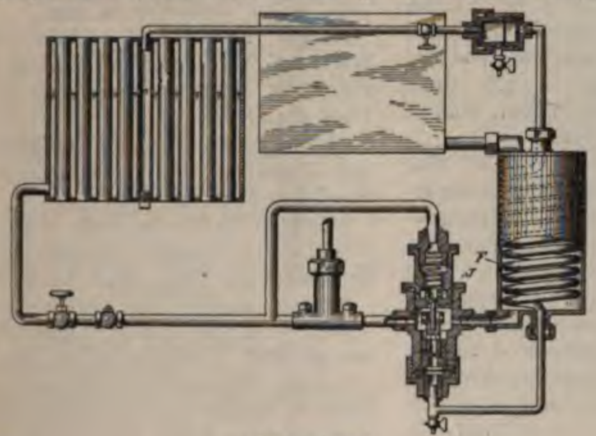
By means of the hand lever P
ing lever M, may be made to re
controlling slide G more or less ag
resistance of the coiled spring to
or even cut off the supply of oil,
farther the pivotal point or fulcru
controlling slide G is retracted f
path of the contact point, the less t
of the latter will depress the pump
til the recess in the slide come
with the point, when the pump wi
operated at all. The effective stro
contact point may be varied by
the position of the rock lever
relation to the centre of the
means of the lever J. If the fulc
is thrown over toward the cam, t



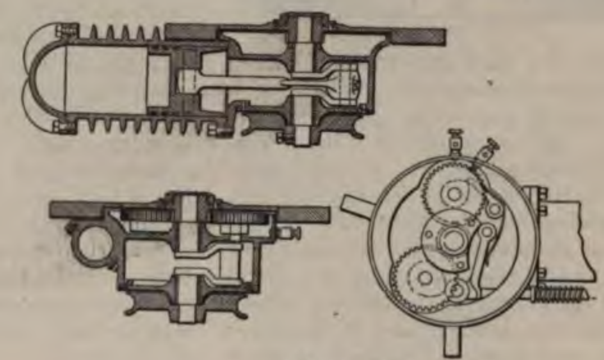
No. 710,087.

of the latter will depress the contact point to a greater extent, and thereby cause an increased feed of oil.

If the speed attained exceeds a certain limit, the governor segment will be thrown out by centrifugal force until it comes in contact with the roller on the upper arm of lever M at each rotation, thereby retracting the controlling slide more or less and modifying the effective stroke of the contact point until finally, if the speed attained is excessive, the governor segment will protrude sufficiently to retract the controlling slide until the recess is brought under the contact point, and the pump will cease to act. The same result may be attained independently and at any speed of running by means of the lever P acting through its roller against the roller on the lever M to rock the latter and retract the controlling slide more or less.



No. 710,317.



No. 710,329.

710,063. Automobile.—Hermann Lemp, of Lynn, Mass. September 30, 1902. Filed March 28, 1900.

In an electric vehicle a triangular frame rigidly connected at two points with the front axle and pivotally connected at a single point to the rear axle, driving wheels and motors supported on the rear axle and located between the pivotal point of the triangular frame and the driving wheels. The motors are pivotally supported by the rear axles, and are spring hung at their opposite sides.

710,317. Automatic Boiler Feeder.—Charles Cummings, of San Francisco, Cal. September 30, 1902. Filed September 20, 1901.

The invention relates to that class of devices for automatically supplying water to boilers in which an outlet is made from the boiler in the horizontal plane of the predetermined water level, whereby water or steam may pass therefrom, according to whether the level is exceeded or not, and means for utilizing the differences between the physical properties of the water and steam that pass this outlet to control the feeding of water to the boiler, and thus maintain the predetermined water level.

The outlet communicates through a pipe with a case C containing a wire gauze screen and provided with a pet cock. From this case a pipe leads to a coiled tube condenser, and from the latter another pipe to the automatic bypass valve J. Water from the supply tank passes through the condenser and through the casing of the bypass valve to the pump.

The object of this invention being to automatically open and close the bypass valve J at the proper time, this operation will be described. Suppose the engine and pump to be running, the boiler making steam at the required pressure, and the water level in the boiler to be below the holes in the central tube. This state of things indicates that more water is needed, and that the pump should be forcing water into the boiler. Steam will flow upward through the tube into the casing C. A portion of the steam will pass through the screen and on through the small opening into the condensing coil F, where it is condensed by the feed water surrounding the coil. Under this condition there is no pressure in the coil nor in the pipe leading into the cylinder of the automatic bypass valve. The bypass valve is closed, and the pump forces water into the boiler.

Now suppose the water level in the boiler has been raised above the holes in the central tube, then water instead of steam will pass up this tube and through the case C into the condenser and on to the bypass valve where a small part of the water passes through an opening in a plate. Only a small part of the water from the boiler will pass through the opening in plate until the coil and the attached piping are completely filled with water. Then all the water that passes through the casing C will pass through the plate in the bypass valve. The pressure on the bypass valve piston will open the bypass and stop the feed to the boiler.

710,329. Explosive Engine for Motor Vehicles.—R. C. Marks, of San Diego, Cal. September 30, 1902. Filed September 7, 1901.

Covers a design of bicycle gasoline motor. The flywheel is located outside the crank case, and the motor comprises novel valve operating and igniting mechanism.

The central portion of the inner side of the flywheel is provided with an enlarged circular recess into which fits a flanged portion of the crank casing and forming a dust proof casing for the reception of the exhaust valve operating mechanism and a timing cam for the sparking circuit. The inner end of the hub is provided with gear teeth which intermesh with the teeth of two gear wheels mounted on fixed studs carried by the crank casing.

To one of these gear wheels is secured a cam adapted to operate upon a lever pivoted on a fixed stud and provided with a contact piece adapted when moved outwardly by the cam to make contact with a block carried by a binding post insulated from the casing and forming a terminal of the sparking circuit. The opposite terminal is formed by a binding post electrically connected to the crank casing, and the circuit being completed at these points once at each two revolutions of the engine and held closed during the time of the passing of the usual sparking electrodes in the cylinder.

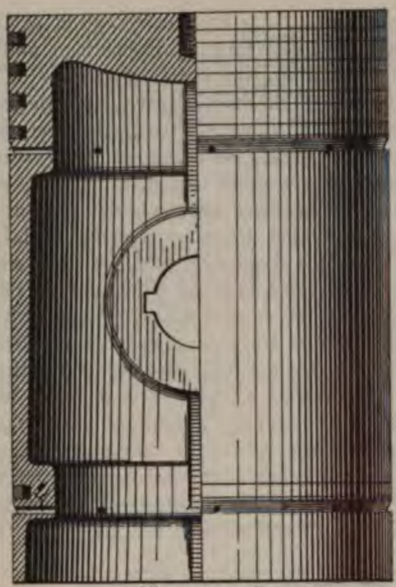
The lower end of the stem of the exhaust valve extends down through an opening in a crank casing, and is seated against a lever pivoted on a stud and having at its free end an anti-friction roller, which travels in contact with a cam secured to the other of the two gear wheels, the construction of the cam being such that it will operate positively upon the anti-friction roller to move the exhaust valve to the open position at or near the end of the working stroke of the piston, such operation taking place once during every two revolutions of the engine.

710,330. Carburetor for Explosive Engines.—R. C. Marks, of San Francisco, Cal. September 30, 1902. Filed January 2, 1902.

A tank carburetor for use on motor bicycles.

710,136. Engine.—Wm. A. Bole, of Pittsburg, Pa. September 30, 1902. Filed August 16, 1897.

In engines provided with a closed crank case the crank case is usually partly filled with oil, and the piston and cylinder of the engine are lubricated by the oil, which is splashed up into the cylinder or on the piston, and in case the pressure in the cylinder between the piston and the cylinder head is at any time in the cycle of operation less than the pressure in the crank case oil is liable to be forced past the piston into the cylinder and to accumulate on the head of

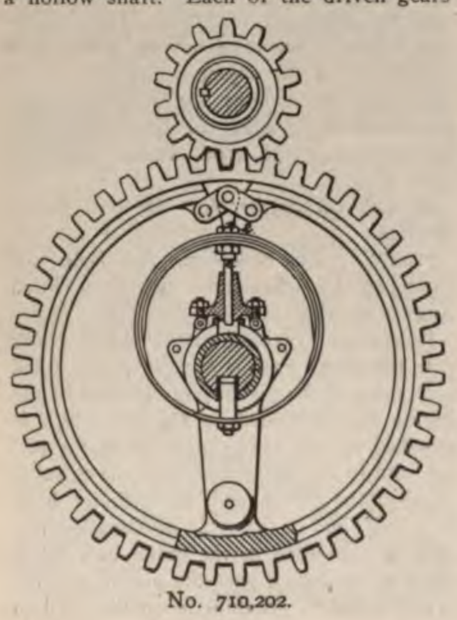

No. 710,136.

the piston and other parts and in the clearance spaces of the engine.

In order to prevent the passage of oil into the combustion chamber, this invention provides grooves on the outer cylindrical surface of the piston, and also passages leading from the grooves into the interior of the piston, which is open to the crank case. The oil in its movement toward the interior of the cylinder collects in the grooves, and the form of the groove is such as to assist the trapping of oil in the grooves either by permitting an easy flow of the oil into the groove over the inclined surface or by the action of the rectangular edge of the groove in sweeping the oil from the inner surface of the cylinder as the piston moves toward the cylinder head.

710,202. Variable Movement Controlling Mechanism.—Hugh D. Meier, of Brooklyn, N. Y. September 30, 1902. Filed July 22, 1901.

An "individual clutch" system of transmission for automobiles, in which the clutches are operated by a cam rod within a hollow shaft. Each of the driven gears


No. 710,202.

is shaped to form a friction clutch drum, and is mounted loose upon the hollow shaft. Within each drum is a split expansible ring. The ring is supported on the shaft by an arm diametrically opposite the ends of the friction ring and having a hub portion encircling the shaft and keyed thereto. The inner edge of the friction ring—that is, the edge nearest the web of the gear—is supported likewise by a similarly located stiffening arm, having a hub portion encircling the shaft, while a bolt secures the two arms and holds all the parts firmly together.

Motion is transmitted to the ends of the friction ring, to cause their separation and the consequent distention of the ring, through a toggle connection embodying a pair of links at each side of the friction ring, the links in each pair being hinged to ears extending from the ring, and the two pairs of links being connected by a through pin, to which the adjacent ends of each pair of links are pivoted.

Normally the ends of the friction ring are drawn together corresponding to the released position of the latter. For the purpose of straightening out the links embodied in each toggle connection and spreading the ends of the corresponding ring apart to cause the engagement of the latter with the friction surface on the respective gear, a separate sliding wedge is used for each ring movable in unison with the controlling bar or cam rod. A disk held in a proper retainer passing through the wall of the hollow shaft cooperates with the cam rod. This retainer is connected with the toggle mechanism through a circular spring. The spring avoids the necessity of making minute adjustments.

708,518. Explosive Engine.—Albert T. Bossert, Kansas City, Mo. September 9, 1902. Filed August 26, 1901.

708,637. Combined Gas and Steam Engine.—William Heckert, Findlay, Ohio. September 9, 1902. Filed October 29, 1901.

708,708. Electrode Separator for Batteries.—Arthur W. Harrison, Los Angeles, Cal. September 9, 1902. Filed May 7, 1902.

708,952. Pneumatic Tire and Process of Manufacturing Same,—John W. Blodgett, Chicago, Ill. September 9, 1902. Filed March 18, 1901.

708,954. Tire and Method of Manufacturing Same.—John W. Blodgett, Chicago, Ill. September 9, 1902. Filed January 9, 1902.

708,967. Machine for Smoothing Rubber Vehicle Tires.—Stephen S. Miller and Lee E. Clough, Akron, Ohio. September 9, 1902. Filed May 14, 1902.

708,962. Electric Vehicle.—Susie A. Henry, Denver, Col. September 9, 1902. Filed December 27, 1901.

709,684. Steering Device for Automobiles.—Gustav R. Schlumberger, of Allegheny, Pa. September 23, 1902. Filed January 21, 1902.

709,483. Tire and Fastener for Vehicle Wheels.—Jacques C. Haines, Chicago, Ill. September 23, 1902. Filed March 10, 1902.

709,546. Vehicle Wheel.—George S. Lee, Hawthorne, N. J. September 23, 1902. Filed January 27, 1902.

709,550. Motor Attachment for Cycles. —Leonard M. Meyrick-Jones, East Dereham, England. September 23, 1902. Filed January 21, 1902.

709,611. Secondary Battery.—William L. Silvey, Dayton, Ohio. September 23, 1902. Filed February 8, 1902.

709,838. Means for Preventing Road Vehicles from Slipping Sidewise.—Edmund T. L. Williams, London, England. September 23, 1902. Filed July 22, 1902.

709,897. Motor Vehicle.—Frank C. Goddard, Akron, Ohio. September 30, 1902. Filed September 9, 1901.

709,900. Free Wheel or Like Clutch.—William G. Gurney and Samuel L. Taylor, Falmouth, England. September 30, 1902. Filed March 6, 1901.

709,959. Vehicle Tire.—Frank P. Brining, Westgrove, Pa. September 30, 1902. Filed February 14, 1902.

709,994. Tip for the Ends of Pneumatic Tire Tubes.—Joseph G. Moomy, Erie, Pa. September 30, 1902. Filed April 28, 1902.

710,135. Rubber Tire Setting Machine. —John C. Blake, Toledo, Ohio. September 30, 1902. Filed August 29, 1901.

710,302. Internal Combustion Engine.—John A. Prestwich, Tottenham, England. September 30, 1902. Filed April 29, 1902.

The Licensing Ordinance in New York.

The board of governors of the A. C. A. and the N. A. A. M. have appointed committees to confer on the proposed ordinance in relation to licensing of automobile operators. The club representatives are G. F. Chamberlin, W. W. Niles and President A. R. Shattuck. The manufacturers designated S. T. Davis, Jr., F. M. Lande and H. Ward Leonard.

Previous to October 7, the date for the hearing before the law committee of the Board of Aldermen, the joint committee will consider the question.

The United States Consul at Para states that attention has recently been directed to the possibilities of the balata fields on the Amazon. A gutta percha merchant in the Guianas, examining this region about a year ago, found the balata tree growing in abundance near Para, and on the Amazon and its tributaries for thousands of miles. The Brazilians had no knowledge of its gum producing qualities. After persistent effort, he succeeded in interesting persons in the United States and Para, bought a concession, and has lately begun the practical work of producing cutta percha for the market. As in the case of rubber, there is practically no limit to the supply of gutta percha on the Amazon, and, as it can be produced at a fraction of the cost of rubber, it offers a much higher percentage of profit.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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The Reliability Run.

As we go to press the last stages of the Automobile Club's Reliability Run to Boston and return are being covered. Few accidents have occurred during the course of the journey, and those not serious to operators or passengers, although putting some of the machines out of action for a number of hours.

The chief troubles, as in former contests, have been experienced from tires and the ignition mechanism of the gasoline machines. Skidding was also a constant danger during the rainy days at and near Boston, but no upset was reported, in spite of numerous hairbreadth escapes.

Comparison with the Buffalo run of last year must first take into account the difference in roads and in weather. Last year the route lay through New York State, where the roads were abominable, and had been made almost impassable in places by an equinoctial storm. The roads of New England, while not all that could be desired, are ideal in comparison with the bogs of the Empire State. The divisions of the run also made it much easier for the contestants this year, this advantage being offset by stricter rules regarding repairs and a closer surveillance on the part of observers and club officials. Several who had been regarded as permanently out of the run in consequence of disabling breakdowns succeeded in effecting repairs in time to join the run again, thus proving that repair facilities have greatly improved within the past year, and that the tourist need not look far for succor in New England, whatever accident may befall him.

One abuse which has shown itself on previous occasions, and was the subject of much adverse comment on the Boston run, was the disposition of non-contestants to crowd into the route in front of vehicles and impede them, in several instances even causing contestants loss of points. The regulation of this matter is no doubt beset with difficulties, but it would seem at least that contestants should not suffer from the careless or wanton interference of those not in the contest.

The table of arrivals and departures at the various controls is unofficial, and in several cases, notably at Norwalk, the representative of THE HORSELESS AGE complained of slipshod and inaccurate timing on the part of the officials of the run, the announced time being entirely out of agreement with his own timepiece, which had just been set and regulated for the purpose. Some time will be required no doubt to adjust all of these differences, but meantime the accompanying table may be relied upon as approximately correct.

Possibly some of the twenty to twenty-five who claim clean scores may be found on investigation to have overlooked a detention or two of small importance, but, however this may be, the number who will receive the highest award will be large enough to establish a record for reliability on the part of the American automobile which cannot be paralleled in automobile contests the world over.

In the present issue we are forced to content ourselves with full and unbiased reports of the run in general and of our official observers, reserving the analysis of the data thus obtained for our next number.

The Business Phase of Automobiling.

We believe that every individual engaged in the automobile and allied industries was deeply interested in the article "18,000 Miles in Three Years" in our last issue. This article proves that if an owner takes the use of an automobile seriously, even the old machines of three and four years ago were entirely capable of supplanting the horse in a service demanding constant use, day after day and all the year around. It may be observed that there are probably only few persons in the country who have driven a total of 18,000 miles in automobiles. Those who drive irregularly, for pleasure only, sometimes make wild estimates of the distance they have covered; but in the case of a physician the mileage can be estimated with considerable accuracy. That the writer of the article referred to has been able to do all his professional work without the use of horses for two and a half years and the results have been so satisfactory that he expects

never to own another horse is a most hopeful sign of the future of the business automobile. And this in spite of the fact that the cost per mile has amounted to a sum which may seem appalling to some who have been furnished with figures based upon cost of gasoline only. The total expense, including wages of driver, depreciation and interest on investment, figures out to 28 cents per mile, slightly more than it is estimated it would have cost with horses. The advantages of the automobile over horses in a physician's practice are such, however, as to entirely overshadow this slight difference in cost.

The cost of operation is certainly a very important point; but more important still is practicability in business applications and convenience. This point may be illustrated by an example. The electric incandescent light is the most expensive light in common use for interior illumination. Yet, because of its greater convenience, cleanliness—in short, its qualitative superiority—this light is constantly becoming more popular, and the industries devoted to the manufacture of electric lighting machinery and fixtures are more prosperous today than at any former period.

The automobile has the same advantages (greater convenience, cleanliness) over horse travel that the electric light has over other forms of illumination, and on this score alone it would succeed. There is no question, however, that in time it will also be a more economical means of travel, if it is not at present.

We take occasion to emphasize again that more attention should be paid by the manufacturers to this field for the automobile. We would not in the least discourage catering to the demand for pleasure automobiles; but are convinced that this demand will reach a climax and that the enthusiasm will die down—perhaps in a decade, perhaps sooner. This has been the history of the bicycle industry. But if the automobile is shown to be better suited to some particular business requirement than other forms of traffic, the demand for it will continue to grow.

The "Special Road" Nonsense.

At regular periods, it seems, special automobile roads are being proposed somewhere, where the vehicles may be used to full advantage, unencumbered by the conditions of other traffic. The summer before last, during the height of the season, such a road was proposed to be built from Paris to Dieppe, the coast resort; later a special automobile road from Brussels to Paris was said to be favored by the King of the Belgians, and more recently the subject of a special automobile road through the British Isles is being stirred up. The argument in favor of such roads is always the same—that interference with horse traffic will be avoided and that there need then be no restriction of the speed of automobiles.

While at first sight there may seem some sense in this argument, the scheme will not bear a thorough investigation. True it is that automobilists are considerably annoyed on country roads by shying horses, but this is only a temporary condition, and it is not unreasonable to assume that in ten or fifteen years horses will shy no more at automobiles than they shy at bicycles now. Now, special roads will certainly not be built to meet a temporary condition. Besides, automobiles could not be run on such special roads exclusively; they would have to use the same road as the horse part of the time, the horse would have to be educated to the auto the same as without these roads and the process would simply take so much longer. Hence the special road would simply retard the education of the horse and would not save in the least the trouble of this problem.

The speed at which automobiles could safely be run on such special roads would also be limited, as it is not only the safety of the horse driver and pedestrian which determines speed limits, but the safety of the automobilists themselves as well.

In ordinary business driving or short pleasure jaunts the automobilist would be on and off the special road continuously; such roads would seem to be of considerable benefit only for touring, and we venture to say that even in touring the majority of people do not care to go at track speeds on roads from which all other traffic is excluded. It is only the class that tours for the purpose of making time records that delights in this mode of touring.

While it is not unlikely that a special straight way automobile track of short length may be built, for racing purposes, the idea of special automobile highways between important centres is absurd, at least as far as this country is concerned. The idea is born of the present speed craze. We want improved highways as rapidly as possible and the only way in which we can hope to secure them is by the co-operation of all road users in the construction of roads for general traffic.

Cocks Law Alleged to Be Unconstitutional.

In the appeal of Harry S. Woodworth, Rochester, N. Y., who was convicted of running his automobile faster than 20 miles an hour at Brighton and thereby causing a runaway, County Judge Sutherland has affirmed the decision of the police justice. Mr. Woodworth's attorney will carry the case to the Appellate Division on the ground that the Cocks law, under which Mr. Woodworth was fined, is unconstitutional because it deprives people of their liberty without due process of law.

The argument of his attorney, Horace McGuire, is as follows:

"The amendment to the Penal Code passed by the Legislature in 1902, and now forming Section 666 of the Penal Code, is unconstitutional and void because it deprives persons of their liberties without due process of law, and is, therefore, in violation of the Bill of Rights found in the State Constitution; as this amendment to the Penal Code unfairly discriminates against citizens, and is unreasonable because it makes the incorporation of a village the test of criminal liability instead of making the built up condition of the locality the test. In elaboration of this point it will be observed that Section 666 provides that a person shall not drive or operate an automobile within any city or incorporated village at a greater rate of speed than 8 miles an hour, and it is a well known fact that many unincorporated villages are much larger and more thickly settled than other villages which are incorporated. Then again the act is nugatory and invalid, because it deprives, or seeks to deprive, citizens and other persons of civil rights existing by virtue of a provision of the statute at the time the new penal Section 666 took effect.

"Section 720 of the Penal Code says: 'The provisions of this act are not to be deemed to affect any civil rights or remedies existing at the time when this takes effect by virtue of the common law or any provision of the statute. Section 666 took effect March 27, 1902. At that time Chapter 531 of the Laws of 1901 was in effect. It is known as the Automobile Act. By Section 163 of that act it is provided that no ordinance, rule or regulation shall be adopted by the authorities of any municipality in pursuance of this section or of any other law which shall require an automobile to travel at a slower rate of speed than 8 miles an hour within any city, town or village of the State in the built up portions thereof, nor at a slower rate of speed than 15 miles an hour where the same are not built up. And by Section 167 of the act it is provided that no

shall drive an automobile in any avenue, parkway or driveway in ate at any speed greater than is ble and proper, having regard to fic and use of the highway, or so endanger the life or limb of any erson.

it is fair to say that this Section only an interpretation of the com- w upon the subject, to wit: That a shall have the right to operate an bile at a reasonable and proper speed, having regard for the traf- use of the highway, and that being mon right the provisions of the Code do not affect such common ht. And because it purports to do s unconstitutional and void. The ination against citizens of incor- villages, however, is very clear ne face of the act. If the village rporated, the speed must be re- o 8 miles an hour; if unincorpo- ccording to the act it may be 20 n hour. And this discrimination wholly, the court will observe, e question whether or not a village porated, and does not depend, as ld depend, upon the built up con- of the locality, nor does it have re- r the traffic and use of the particu- hway, but discriminates in favor of rated villages against unincor- villages."

Legislative and Legal.

oke, Mass., is about to adopt a 10 nit.

uto numbering ordinance is pro- at Minneapolis.

soline automobile is to be tried for ger service between Comstock and ead, N. D.

Picard, of Chicago, who was re- fined for excessive speeding, states will appeal the case.

Cushman Motor Company has rganized at Lincoln, Neb., with capital by H. W. Davis and L. S. E. Cushman.

Morris County board of freehold- orristown, N. J., has instructed its to prepare an ordinance limiting ed of automobiles.

cis P. Morris, of Villanova, a stu- t the University of Pennsylvania, ently fined $10 and costs for driv- automobile on Lancaster pike, Township, at a speed of 15 miles r.

ovement to license automobiles has tarted at Portland, Ore. A fee of month is proposed. There are now be twenty-one autos there. A proposal has been made at San co.

ordinance which is now before the City board of aldermen requires class engineer's license of the op- of an automobile and makes it incumbent upon drivers to keep on the right side of the road. The local automobile club is still holding its training schools for horses and is in conference with the authorities in regard to the framing of the ordinance. It does not oppose the license clause.

Very few of the 1,000 estimated automobile owners in Essex County, N. J., have so far complied with the law and registered their names with County Clerk Kuebler. A penalty of $10 is incurred by failure to register.

In the case of Robert B. King, of Pittsburg, against the Consolidated Traction Company, same city, for damages, owing to the destruction of plaintiff's automobile by a trolley car several months ago, the jury returned a verdict of $1 for the plaintiff.

Herman Unger, the Newark, N. J., jeweler, who was recently stopped for fast driving at Scotch Plains, has carried the case to the Supreme Court. His lawyers claim that the law is unconstitutional because it fixes a different rate of speed for automobiles from that of other vehicles.

Damages in the sum of $12,070 were awarded to Joseph B. Hughes, of New York, at Trenton, N. J., last week (Tuesday) in his suit against Felix Warburg, whose automobile frightened Mr. Hughes' team at Seabright, N. J., last summer and caused them to run away, killing one horse and injuring the owner. The defendant will appeal.

Henry L. Blum, of Lodi, N. Y., whose automobile frightened a horse and caused the death of Richard Henches at Hackensack, N. J., last May and who settled a civil suit recently brought by the heirs of Henches for $2,000, has been indicted by the grand jury of Bergen County for maintaining a nuisance. His chauffeur was also named in the indictment.

Captain John S. Muckle and Henry G. Morris, who were appointed a committee from the Automobile Club to act with other committees in drafting a new vehicle ordinance for Philadelphia, have reported a measure limiting the speed of vehicles within the city limits to 10 miles an hour and making the penalty for first offense in the automobile class $25 and for a second offense revocation of license. Offenders in other vehicles are fined in smaller sums.

A case involving the liability of towns in runaway accidents caused by automobiles is just now attracting attention in Connecticut. It is the case of Charles H. Upton, administrator of the estate of Mary B. Upton, against the town of Windham for $1,500 damages, owing to the death of the latter in consequence of a horse they were driving running away at sight of an automobile. There was no railing to protect the highway at the point where the horse plunged down the embankment, and the question of the degree of liability in this and other cases will, no doubt, have to be decided by the Supreme Court.

...COMMUNICATIONS...

Why A 74 Dropped Out of the Run.

STAMFORD, Conn., October 13.

Editor HORSELESS AGE:

As you are probably aware, we had two vehicles entered in the Reliability Run, and one of them, the Buffalo, Sr. (E. R. Thomas Motor Company's make), broke down in Baychester, about 10 miles from the starting point. This machine was left at the agent's place in Forty-third street the day before the start to have a new connecting rod put in. They put an incompetent man on the job, who left the wrist pin sticking out about 1-32 inch, and in trying to put in the piston he got it stuck in the cylinder and it took two men to get it out again, after breaking two of the rings. They then took a new part out of a new machine and after five hours' work, all told, and charging us $8, they turned the machine over to us in apparently good shape.

When we started on the run we were congratulating ourselves on the smooth running of the machine; but, alas! after 10 miles we came to grief, and upon examination we discovered the bolt which holds the connecting rod on the wrist pin lying in the bottom of the crank case. It then dawned upon us that we had been the victims of gross carelessness on the part of the "cheap" repairman. He had failed to secure the bolt and it unscrewed, thus causing the rod to part from the piston and breaking the end off the rod. This put us out of the contest, caused us the loss of $50 entrance fee, $8 for his bad job, and a whole lot of valuable time.

We hope you will print this as a communication, in justice to us and the manufacturers of the machine.

MECHALEY BROTHERS.

State Road to the White Mountains.

The New Hampshire board of trade is actively urging upon the Legislature of that State the making of an appropriation to be devoted to the commencement of construction upon the Merrimac Valley State highway from the Massachusetts State line to the White Mountain region. It is desired to secure at once the necessary funds for building the road from the terminus of the Massachusetts system through the cities of Nashua and Manchester and into Concord, and an energetic campaign is being directed toward this end.

A number of wealthy automobilists of Southern California are to build a special auto road between Shasta Springs and the McCloud district.

The A. C. A. 500 Mile Reliability Run from New York to Boston and Return.

General Report.

THE START.

The start of the six day Reliability Run of the Automobile Club of America at New York on Thursday last was all that could be desired. The cars were sent off promptly according to schedule, and the confusion that had marred previous contests was avoided.

It was pleasing to note that there were many machines of moderate price and reasonable horse power entered, and gratifying to realize that the 500 mile run was not for the $5,000 or $10,000 imported road rollers alone, but that its honors were to be contested for on even grounds by the less pretentious and more practical motor vehicles.

As the machines were lined up in Fifty-eighth street awaiting the start, each with its official number boldly displayed and its official observer equally prominently decorated, one could not help wondering whether or not they would be as ready to show that number after 500 long miles up hill and down dale.

The operators of the various machines were wide awake to the fact that this was to be no sandpapered road contest, and each appeared to fully realize that the test would be a strenuous one, and prepared himself accordingly.

There were tool boxes stuffed unusually full of things likely to come handy in time of need and also boxes which bulged with extra spark plugs, jackets, lubricants, and in fact about everything extra which could be carried and still keep the contestant within the pale of the club's rules and regulations.

FINAL TOUCHES.

Every spare moment before the start was put in by the men connected with the various machines in making final preparations. Each nut and bolt and every wire connection on the gasoline machines was gone over, while the steam men were not a moment behind as far as the making ready arrangements were concerned.

The air was full of the sharp exhaust of the steam air pumps as the tanks were filled to the gauge limit, and oil cans without end flashed in and around gears, wheels, differentials and driving chains. Each man appeared rushed to death and fully conscious of the fact that if he himself did not go over the machine at least ninety-nine times, success would be an impossibility.

Machines of the same make (some manufacturers having entered two or three) naturally enough huddled together in little groups, as if seeking encouragement from one another.

As the big black hands on the plaza clock swung slowly around toward the hour of the start, 9 o'clock, the excitement increased. Official observers sought out their machines and hovered near them. The operators of the gasoline cars monkeyed with levers and clutches and started their motors only to stop them a moment later satisfied that all was right. There was some confusion at the clubhouse with and among the officials, but things gradually straightened themselves out and the first carriage in line was called to the starting point.

FIRST OFF.

It proved to be C 1, the 24 horse power tonneau touring car entered by Harlan W. Whipple; a Panhard manufactured by the Ohio Automobile Company, and it was sent over the line at exactly 9 o'clock and went speeding down Fifth avenue, followed by the cheers of the crowd. The other vehicles followed at half minute intervals until finally the last of them had crossed the line and seventy-five of the eighty machines entered were under way.

SCENE IN FIFTY-EIGHTH STREET BEFORE THE START.

S. T. Davis, Jr., and the Loco Steam Touring Car.

The non-starters were C 9, A 22, C 53, B 72 and 78.

A few of the high speed cars experienced the usual difficulty in keeping their motors going and the street resounded with the long roll of their four or more cylinders as they were held in check by the governors.. Down Fifty-eighth street one double cylinder machine of American make was holding a sort of a Fourth of July celebration of its own, the engine back firing in the muffler with a report that sounded like a small cannon or the peppering of a gatling gun. The camera fiends were in great evidence and at the starting point a moving picture machine snapped the autos as they crossed the line.

Secretary Butler and the club officials were active in their duties and the manner in which they succeeded in getting the long line of carriages in motion reflected credit on them.

NON-CONTESTANTS CREATE CONFUSION.

There were the usual number of non-contestants gathered around the start in their machines and some of these even went so far as to get in line with the vehicles entered. When they reached the starters there was confusion and several minutes were lost in this way before they could be put out of line.

AT THE NORWALK CONTROL.

The first machine was not due here until 12 noon, but even before it arrived at the official stopping point, the Norwalk House, two high powered French machines dashed up, their occupants covered with dust. They told of passing "the bunch" several miles down the road "creeping," as they expressed it, and guessed they would be along before dark some time.

A representative of The Horseless Age, who was on the train speeding past Mamaroneck, saw a double cylinder tonneau car in trouble. The machine was of American make, but the number was hidden from view by the operator's coat being thrown over it. The case was diagnosed as one of "tire troubles."

EXTRA PARTS BY TRAIN.

A striking example of the way in which some men interpret the club rules was seen at South Norwalk. A number of newspaper representatives had come down to report the run, and besides these there were two young men apparently interested in some machine entered, judging from the drift of their conversation. They told their hopes and ideas of the car they favored. For some reason or other the operators of the machine in question desired to keep down weight and the two men on the train were carrying along extra parts and supplies to be loaded on the car at South Norwalk. One of them carried two extra inner tubes for the tires and each had a bag which from all appearances was exceedingly heavy. While going down the stairs leading to the tunnel under the tracks of the railroad at South Norwalk one of the men in some manner let his grip fall and it rolled down stairs with a crash, landing on the bottom and coming open, the lock having given away.

Instantly the ground was covered with sparking plugs, cut gaskets of all sorts, half a dozen battery cells, two knuckle joints, and bolts, washers, screws and nuts without end. There was also a varied assortment of other auto parts which bystanders helped gather up. "Under ordinary touring conditions" it is scarcely too much to say that a partially new auto could have been constructed from the collection shown so unexpectedly.

All was quiet when we reached the Norwalk control station, and remained so until a few moments past 12 o'clock, when C 1, a 24 horse power Packard touring car, came creeping down the street and pulled up at the hotel just fifteen seconds ahead of time. The machine was kept moving at its very slowest speed until the quarter of a minute had expired, then the official observer handed his book over to the club's timekeeper for the latter's signature. This machine was the first started at New York, and it had been running on the second speed for the last mile or two to kill time.

A. L. Riker in the Locomobile Gasoline Touring Car.

THE WHITE PROCESSION LINED UP FOR THE START.

The first carriage to appear at the Norwalk control was B 39, which came slowly up the street at 11:57 a. m., but, being ahead of time, turned around, went back and did not come up to the control until 12:04:30.

PUNCTURED TIRES.

Another cause of this was a punctured rear tire. The machine had not been stopped after the puncture occurred, and when it reached the control the outer shoe of the tire was badly cut and practically ruined. A new tire was put on by the chauffeur in charge of the car while its owner was in at dinner.

Several other machines also had punctured tires, and one or two non-contestants were obliged to put in new inner tubes at the control station.

HOLDING IN THE BIG FELLOWS.

Several of the big machines had been compelled to use their second and third speeds to keep within the club's time limit, and not a few of these arrived with the front slats out of their motor hoods in order to let them cool better, and even with this precaution the cooling water was boiling and clouds of steam came from the overflow pipes.

Machine B 49 was the only one pulled apart at the noon stop, and an expert put in the entire time allowed in disconnecting, readjusting and putting together again the mechanism for starting the motor.

A QUEER ACCIDENT.

C 67 was delayed about thirty minutes in Stamford by a peculiar accident. The machine is equipped with outside drive. A small boy threw his cap at the machine as it passed him. The cap caught in the right driving chain and was drawn over the sprocket, bending both the distance rod and the end of the driving shaft.

B 69 came in at 1:03 p. m., having been delayed on the road by their transmission gear, the clutch refusing to hold well on the gear, owing to its running in oil. This carriage was also delayed in leaving the control by the clutch, and the operator had to draw off the oil from the transmission gear case before starting.

ENCASED MOVING PARTS.

One noticeable feature was that all the machines, even to the light runabouts, had taken the precaution to encase their motors, transmission gears and chains after the style of the big French cars. The little Ramblers were the only exceptions noted, and they seemed to say: "We may be small, but we'll get there just the same," and from the manner in which they made the controls it looked as if they would. These machines seemed to be troubled with insufficient water cooling surface, for they were invariably steaming through their ex-

C 1, FIRST OFF.

H. Bartol Brazier and His Touring Car.

haust pipes when they reached the controls.

THE COMBINATION FAILS TO WORK.

No. 50, a sort of a freak machine having a gasoline motor connected with a dynamo which was designed to recharge the batteries en route, created considerable comment, but at last accounts the motor was moting, but the dynamo was not "dynamoing," and the machine did not reach the New Haven control.

The scene at the noon control was a busy one and one to delight anyone interested in the automobile. The machines in the run are better looking, stronger, more quiet and more reliable than the old ones. Many of them were fitted with a rubber cloth hung underneath the body to protect the machinery from dust and mud. This is a good idea, and some such arrangement should be fitted to every automobile that is intended for practical service.

With the exception of one or two tires, most of the machines arrived in good condition, and there was very little repair work or adjusting to be done. When the machines started for the afternoon run and left the control the first few were sent off in bunches and so rapidly that it was next to impossible to get time on them.

At the departure B 51 "broke some nut" that let steam out; did not see machine until ready to start and my informant could not state exact location of break.

A 54 started at 2:25, after trouble with spark plug.

B 69 started at 2:29, after trouble with clutch, as stated before.

C 34 had not left control at 2:45 p. m. It was delayed by a puncture on the road from New York and was late in reaching control.

THROUGH BRIDGEPORT.

Several of the officers of the Automobile Club of Bridgeport took keen delight in witnessing some of the officers of the Automobile Club of America get their bumps Monday afternoon on the road between Bridgeport and Stratford. There was a mean "thank you, ma'am" in the road on down grade, and some occupants of machines jumped high in the air and one contestant lost his hat.

The Bridgeport club stationed two automobilists at the point to warn the tourists, but when George F. Chamberlin, of the committee, came along they let him plunge into the obstruction and take his flight skyward without compunction. As Arthur K. L. Watson, vice president of the Bridgeport club, said, "He deserves it for stopping over in New Haven instead of Bridgeport."

Owing to Stratford avenue being torn up, Secretary Butler on Monday wrote the Bridgeport club to look over the ground and, if necessary, change the route and mark it. The Bridgeport club had a meeting that night, appointed a committee to put up new arrows over the upper, or Barnum avenue, route to Stratford, 3 miles distant, and arranged to turn out in force to welcome the participants in the run Thursday afternoon.

The arrows were all put up Wednesday, and on Thursday members of the local club were stationed at each turn in the course through the city, so that no tourist could possibly go astray. At the western end of the city the van of the run was greeted by some twenty-five machines and their occupants. These cars bore the blue pennant of the Bridgeport club.

Previously the mayor and superintendent of police had given the local club and the A. C. of A. ample assurance that everything possible would be done to make the run a success, so far as it pertained to Bridgeport. Admirable police arrangements prevailed, officers being stationed at all corners to keep the road clear.

Several independent machines came in ahead of the contestants. In one of these was Col. John Jacob Astor. Between 2:30 and 3 o'clock twenty-two machines rolled in. Kenneth A. Skinner's De Dion-Bouton C 39 was first into the city of the regulars, and Leonard D. Fiske's Panhard C 66 was a close second. In the first bunch were A 63, C 18, C 59 and C 42.

All the tourists were covered with dust

Coming Down Into Norwalk.

THE NORWALK CONTROL.

and, with their extra tires and luggage, looked as though they were out for bear. President A. R. Shattuck's big gasoline machine with a top over the tonneau attracted much attention, as also did the little three wheeled Duryea, which seemed to keep up with the procession without trouble.

So far as I could learn none of the contestants was disabled at Bridgeport. Not a soul put in for repairs at the automobile station.

AT THE NEW HAVEN CONTROL.

The New Haven control, established at the deserted wheel works, was commodious as a garage in which to store the machines over night. The first car in from South Norwalk was B 39, a De Dion, which pulled up in front of the timekeepers at exactly four and one-half minutes past 4.

The others were not far behind, and in a short time the street was crowded with autos of all sorts. These were admired and commented on by the large crowd of Yale students, who flocked out of the neighboring college buildings to view the machines.

There seemed to have been few, if any, mishaps on the road and judging from the stories told by the chauffeurs and observers, the run had been an ideal one.

One machine, a large French car, came in with the starting handle revolving rapidly around in front, the starting ratchet evidently having become clogged with dirt. But with the exception of an added amount of dust and mud the machines looked no different than when they left New York.

Each was filled with gasoline under the eye of the official observer and was then run into the garage and locked up for the night.

The evening was spent pleasantly at the New Haven House and there seemed to be a general sentiment that the greater part of the cars would come through in good shape. The merits of the big loco

LUNCHING IN THE CAR AT NORWALK.

g car of gasoline power and the son Brothers' entries were discussed gth and the impression seemed to be ble.

ATE PRICE AND MODERATE POWER THE TREND.

as evident from the conversation of en who are in a position to know he leading manufacturers intend to e high speed touring car severely and stick to a medium priced ma- so constructed as to stand the rack erican roads at an average speed of es an hour or thereabouts.

re was no end of complaint to be from the chauffeurs and owners of gh speed cars over the 14 mile an estriction, and these to a man main- that at a 30 mile an hour clip their vould show up much better. From ications some of the high speed fel- vill have pretty badly racked motors time they see New York again.

ht and early Friday morning the was down stairs and preparing to the garage. Even at this hour the of the Knight-Neftel's combination ne and electric car was still in doubt. La Roche's 16 horse power Dar- and a Buffalo gasoline machine, had not put in an appearance when ontrol closed last night, were still g, and it appeared as if they had ed

OUT OF THE RUN.

entrance to the garage was closely ed by two police officers, who al- none inside except those properly d with the club's badge.

ADJUSTING FOR THE START.

re was more or less adjustment to ne on all the cars, and on one ma- the chauffeur in charge put in the ours between 7 and 9 o'clock in re- g his crank case cover and filing the brasses on his crank pin bear- ey having worn and troubled him cking.

the cars were, of course, carefully ted, but the extraordinary good njoyed so far had made extended unnecessary.

machines lined up on both sides of eet about 9 o'clock and tooted their and clanged their bells in order to strate their anxiety to start.

nptly at 9 the club officials sent car off and the others followed at fif- cond intervals. Half the town was see the machines off, and the squad ce detailed at the starting point had ands full to keep the street clear ive the timekeepers a chance to heir entries.

E IRREPRESSIBLE FRENCH RACER.

n the last machine was gone THE LESS AGE'S representative lost no getting the first train for Hartford, North Haven the train in which he passenger met several of the auto- s. One gray colored French touring car shot out from the crowd and for ⅛ mile, where the road ran parallel with the railroad tracks, it sped along at a speed not less than 40 miles an hour, and kept even with the train until it stopped at the North Haven station, when the machine shot across the tracks and was lost sight of.

At Wallington again another crowd of autos was overhauled, and these were engaged in a slight brush, in which several small runabouts took a leading part, evidently holding their own fairly well. The White delivery wagons were well up in front, while a Winton was going along on its slow speed as if in some sort of trouble.

A machine bearing the official blue flag was speeding along and passing everything in line, evidently intent on reaching the town before the main crowd.

Just outside the town a tonneau machine was stalled half way up a steep grade. At Yatesville A 54, B 31, C 1 and a number of other cars were passed speeding along toward Meriden. The Duryea three wheeler, which appears to be an almost impossible mechanical contrivance, was seen along the road, and the driver, waving his hand to the interested passengers, who crowded the rear platform, let out a burst of speed and gained perceptibly on the train, which at that time was doing better than 30 miles an hour.

Several of the machines were in sight as we passed along toward New Britain, and all seemed to be doing better than the 14 mile an hour limit. The numbers on most of the cars were undecipherable at a distance owing to the heavy clouds of dust rising up from the 200 or more rear and front wheels, which churned it up in masses.

THE NON-CONTESTANT NUISANCE.

A number of non-contestants, as usual, went through at top speed and came in ahead of the regular entries.

THE HARTFORD CONTROL.

A 64 was the first machine entered to come in and its time was put down as 11:51:15. The others followed in rapid succession.

ACCIDENTS.

One of the Haynes-Apperson entries met its fate and what nearly proved to be its quietus while running at full speed near Meriden, Conn. The car suddenly struck a sandy spot and before the chauffeur could prevent it had turned and run into a deep gully. From the meagre reports received at the control it seems that a swivel joint on the front axle was smashed and the machine so badly damaged it could not continue. The accident occurred while the car in question was trying to pass a Packard on a rather narrow road.

One of the United States Long Distance cars came into the control with the front axle badly bent on the left side. This damage was sustained in a collision, it was said, with a trolley car, the machine skidding on a muddy asphalt pavement and crashing into the car. Luckily no one was hurt. Despite the fact that the left front wheel ran at an angle of 35° the car continued in the run, the operator deciding to go along to the night control, if possible, and fix it up there.

A rather peculiar accident, which occurred to one of the Fournier Searchmonts, was the subject of conversation at the Allyn House. It seems that a mischievous boy had thrown his cap at the machine with the hope of seeing the heavy car run over it. Instead of going under the wheels the hat caught in the right driving chain, which was rather loose, and threw it off. The woodwork of the car was chewed considerably and a distance rod badly bent as a result of this juvenile curiosity, which has become so familiar to automobilists in New York. The damages sustained were repaired at the garage, but the car had to be penalized for the stop.

MANY CLEAN SCORES.

A large number of official observers at this stage reported that they still had a perfect run to date, with no penalized stops. The number of machines enjoying this distinction was pleasing to note.

The Haynes-Apperson car, the accident to which has already been related, managed to get fixed up at a country blacksmith shop, where a new king pin was forged and the old axle hammered out and straightened. It reached the control after 7 o'clock and put up for the night at the garage with the other machines.

De Dion 54, which had been reported out of the race for good, both wheels having gone flat to the ground when the axle snapped at the knuckle joint, also managed to limp in just before the control closed at 5:30 o'clock.

At Hartford the entire company was entertained at luncheon by the Hartford Rubber Works Company.

COMPLIMENTARY BANQUET AT SPRINGFIELD.

The night at Springfield was a most enjoyable one, the greater number of the contestants spending it at Cooley's Hotel, where the banquet given by the Knox Automobile Company was held. This proved to be a pleasant affair, and it ended up with speeches by Presidents Shattuck and Scarritt, Geo. F. Chamberlin, of the A. C. A., and other well known automobilists.

OFF FOR BOSTON.

The machines lined up shortly before 8 o'clock on Saturday morning along Marble street, at the far end of which the garage at the Springfield Riding Academy was located. All the cars seemed to be in good shape and prepared for the run to Worcester, which was said to be the hardest stage of the contest, and which proved really worse than the "croakers" painted it.

The start was made, as usual, promptly at 9 o'clock, and instead of going ahead by train, as intended, your representative accepted the kind invitation of Elmer Apperson to ride in car C 23, a 16 horse power six passenger tonneau touring car of the Apperson Brothers' make. The car was a beauty in appearance, and, contrary to the general rule applying to good looking

things, it was an excellent machine, easy running, noiseless and economical. The machine is so hung on its unusually long springs that the ordinary road jar is practically eliminated, and a cobblestone road is little different to the passenger from a hard macadam or a smooth asphalt.

In due time the car was started and sent speeding down the Springfield streets in hot pursuit of the score or more of machines which had preceded it, the writer occupying one of the tonneau seats. One after another these were overhauled until we were well in front of the van, and then, as the early morning fever for sprinting seemed to have abated, we followed the general example and dropped into a 14 or 15 mile an hour clip.

TROUBLES BY THE WAY.

The first car we passed stalled was B 15, which seemed to be having some motor troubles.

Our car sped along, doing a wondrous amount of work for its rated horse power and negotiating grades on the high speed that even the big Panhards had to take on their gears. We passed a number of cars loafing along which early in the morning had been the leaders in the sprinting.

Car C 41 had trouble on a slight grade about 10 miles out of Springfield, and the observer was "rendering every assistance in his power" by pushing.

Just outside of Palmer, in a thinly populated section of the country, car A 54, the De Dion which made such a game fight against adverse circumstances yesterday, met its fate. When we passed both the front wheels were flat on the ground, with the motor and cooler on top of them.

"The lightning of fate" had struck twice in the same place, and the car was put out of business by exactly the same accident that it suffered on Friday, but with less chance of getting repaired, as it was in a thinly settled portion of the country. There was plenty of sympathy for the chauffeur and observer from the other machines as they passed, but no help, for to stop would have meant to be penalized. When we swept out of sight the two men were sitting disconsolately by the roadside viewing the wreck.

LOST HIS GASOLINE.

Just beyond this point B 40, an autocar, was stopped at the roadside, while the chauffeur ran back down the road for the purpose of securing some gasoline, a pet cock having accidentally opened and allowed his entire tankful to run out. This car afterwards passed us, going at a high rate of speed, while we were dragging along and having very singular troubles of our own. We were obliged to literally plow through

A HERD OF COWS

along the road, as they refused to move, and our front tires bumped more than one pair of bovine legs before we got clear of the fifty or more traveling dairies which blocked the road.

CLIMBING BYRAM HILL NEAR GREENWICH

THE START FROM NEW HAVEN.

At the Night Control in Springfield.

At Westport we passed A 79, which had evidently run hot and which was being cooled off with a bucket of water.

At Warwick we passed B 6, which was stopping for water, while at West Brookfield A 41 was stopped and the operator was doing service at the crank, while the observer manipulated the hand gasoline pump in the rear.

B 31 was passed a short time later, apparently deserted, by the roadside, while its occupants availed themselves of one of the club's non-penalized stops.

At Spencer C 67, a large French looking car, passed with the rear brake off the right side, it having gotten out of order in some manner.

STEEP GRADES.

It was along the steep grades in this section of the country that several machines met their Waterloo in hill climbing and we came very near to being a victim ourselves. For some reason or other the gasoline did not feed into one of the cylinders on our car and this dragged, cutting down the power of the car 50 per cent.

Foster Hill, Near Spencer.

This occurred just as we started the ascent of a steep grade and it became necessary for the mechanic, the observer and myself to get out and push. With our weight out and the help we gave it the engine picked up a little and managed to pull over the grade amid the loud comments of the crowd that had gathered to see the autos pass through.

We sped down the other side of this hill at a very high rate of speed and suddenly swung around a corner without slowing down in the least. The car careened in a manner which brought to my mind a full realization of how the Fair accident occurred, and when we were on the straight road again I was more than thankful.

A hill of at least 15 per cent. had to be climbed near Leicester and a large number of the independent machines had stopped here to see the cars go up. Among these were a number of members of the Marlborough Automobile Club. Our machine negotiated the hill very well on the lowest speed, but I noted that the official observers and passengers on a number of the lower powered rigs were out and pushing. We had a short stop on the hill, Mr. Apperson experiencing some difficulty in engaging his low speed gears.

C 1, Mr. Whipple's 24 horse power machine, could not get up the grade until five of the six passengers had gotten out and lent their assistance.

E. A. Riotte, in his little 7 horse power, U. S. Long Distance, made an excellent showing and went over the crest of the hill on his second speed with apparently no difficulty.

A WATERLOO.

The other side of this hill is another 15 or 16 per cent. grade, which was a poser for some of the cars on the return trip. It seems that when the advance guard reached the hill a 24 horse power Panhard stuck half way up, blocking the road for the others. Some of the machines went into the ditch at the side of the road and these were saved from a black mark by the passengers and observers getting out and pushing. Several machines came to a full stop on the hill, two of these being the cars operated by Mr. Murchaser, Mr. Fleming and also No. 76.

There were only two morning starters who did not report at Worcester, one of whom was Dr. Hovestadt, who broke his steering gear, as previously told, he being the operator of car A 54.

Mr. Foster lost time by extinguishing his pilot light, and Frank A. Pierce by short circuiting his batteries.

LIGHT RUNABOUTS AS HILL CLIMBERS.

The light runabouts, with their small single cylinder engines, made infinitely better showings than did the heavy, higher powered rigs when it came to hills or bad roads. The light cars, with their comparatively broader tire surface in comparison to their weight, skimmed over the ground, while the heavy touring cars plowed along, the wheels sinking deep in the sandy soil and leaving a long trail marking all four wheels after their passage.

LOAFING INTO WORCESTER.

When we arrived at Worcester the road between Leicester and that city was lined with machines, all loafing along at their very lowest speeds in order to kill time and not arrive ahead of their schedule.

Previous to this Saturday morning the weather had been bright and clear, but Saturday dawned dark and threatening, and there was every indication of the rain which came later in the day.

MORE REPAIRING AT WORCESTER.

After a luncheon at the official restaurant at Worcester the chauffeurs and observers returned to their cars and prepared for the last stage of the run. There seemed to be more taking out of spark plugs and other adjustments made here than at any other point on the run, and it was evident that after the morning's grilling the operators were a bit wary of the afternoon's stage.

Shortly after 2 o'clock, when the first machines had been started, your representative made his way to the depot and boarded a train for Boston, arriving there in good time and reaching the Harvard

Lonely and in Trouble.

Automobile Station No. 2, the official garage, long before any of the contestants.

A MISSING TIRE.

The first non-contestant car which had followed the run from New York rushed in shortly after 4:30 o'clock, with one rear tire missing. The occupants were not aware of the loss of the tire until they were told of it and thought the jar due to it being gone had been caused by passing over the cobbled road.

ENEMIES REMOVE THE ARROWS.

Several other large cars and a little three wheeler used for advertising purposes also came in, and these reported that some mischievous persons had gone over the road between Worcester and Boston and destroyed every one of the club's arrows, flags and other marks placed to show the road.

Owing to this the greater number of the machines went around by the way of Marlborough, a distance of 8 miles out of the way, and from all accounts there was some lively racing to make up this distance within the schedule time, which the majority of the cars did.

On leaving Worcester the Torbensen Gear Company's machine, A 19, met with an unfortunate accident. While proceeding at fair speed it skidded on the wet asphalt, slewed over the curb and struck a building, breaking a wheel and bending the front axle. Repairs were made, however, and the plucky little machine reached Boston Sunday morning.

RAIN AND RACING.

The first machine in was B 39, which came down the street and skidded along into the control, its occupants wet to the skin by the heavy drizzling rain that was falling. This car was driven by Kenneth A. Skinner, and its official time was exactly 5:35.

WITH THE MISSING.

It will be seen by a reference to the table on another page that Nos. 9, 14, 19, 22, 44, 56, 53, 54, 72, 73, 74 and 78 were the only ones missing.

No. 9 did not start from New York.

No. 14, an autocar, was last reported at New Haven, which place it left at 9:15 a. m. on October 10. It did not reach Hartford.

No. 19, a 5 horse power gasoline machine entered by the Torbensen Gear Company, came through all the early schedules on time and was last reported as leaving Worcester, Mass., on the afternoon of October 11 at 2:33 o'clock. It did not reach Boston at the hour of closing the control.

Car 22 did not start from New York.

C 50, entered by the Neftel Automobile Company, of New York, was the gasoline-electric combination car which has created so much talk. It started from New York at 9:21:30 on Thursday and reached Norwalk, Conn., at 2:35:20. It left Norwalk at 4:26 and did not reach New Haven. It was not heard of after that time.

C 53 did not put in an appearance at the start in New York.

A 54, a De Dion motorette, met an accident between Hartford and Springfield, as has already been related and subsequently when 10 miles out of Springfield met the same accident and went out of business for good.

B 72, a Georges Richard 10 horse power gasoline car, did not start from New York.

B 73, a Foster 4 horse power steam machine, entered by Dr. M. A. Carman, left New York 9:0:15 on Thursday and was last reported as leaving Springfield at 9:15 Saturday morning. It did not reach Worcester, but at 11 o'clock Saturday night Dr. Carman and his observer reached Boston drenched to the skin.

B 74, a 6 horse power gasoline runabout of the E. R. Thomas Motor Company's make, entered by Mechaley Brothers, left New York, but did not reach Norwalk and was not again heard from.

Car 49, a 16 horse power Fiat, entered by C. H. Tangeman, had trouble between Worcester and Boston and came in at 5:37:15 with 120 minutes, or points, against it. Gear troubles, which rendered the second speed of the car useless, caused the delay.

SIXTY-EIGHT CAME THROUGH TO BOSTON.

It will be seen from these figures that of the seventy-five cars starting from New York five gasoline, one steam and one electric vehicle are all that are reported officially as missing, and sixty-eight machines came through and are in Boston.

The following is an unofficial but very nearly correct list of the machines which came through the run to Boston without stops and of those which had penalized stops. Nothing official of this sort will be issued by the club until some time after the run is completed.

The list was secured from the observers who were interviewed as the cars came in. It is as follows:

Operator and Power.	H.P.	Stops.	Penalized. H. M. S.
K. A. Skinner, gasoline........	8	2	2:50
Mr. Fleming, gasoline.........	15	1	20:00
W. A. Sweet, steam............	8	0	....
C. H. Page, gasoline...........	4	0	....
R. M. Owen, gasoline..........	4	1	15:00
F. S. Ourish, gasoline..........	6	1	5:00
H. A. Knox, gasoline..........	8	0	....
F. H. Fowler, gasoline........	8	1	24:00:00
Ben D. Smith, gasoline........	12	3	40:00
Percy P. Pierce, gasoline.......	4½	0	....
Forest Cameron, gasoline......	4	3	14:00
Arthur Gardiner, gasoline......	6	2	2.30
W. A. Fredericks, gasoline....	6	1	2.00
C. J. Mason, gasoline..........	8	0	....
Elwood Haynes, gasoline......	9	0	....
Frank Nutt, gasoline...........	9	0	....
C. H. Wilson, gasoline........	4	0	....
Percy Owen, gasoline.........	15	1	30
M. H. Winters, gasoline.......	16	4	22:00
Fournier, gasoline...............	8	1	20:00
P. H. Deming, steam..........	6	0	....
L. T. Sackett, gasoline........	8	1	20
J. C. Chase, gasoline..........	10	1	2:00
A. J. Schaffe, steam............	6	1	7
G. S. Waite, steam.............	6	0	....
S. C. Michener, gasoline.......	6	3	24:09:00
M. R. Hughes, Jr., steam......	6	0	....
W. T. White, steam............	6	0	....
J. F. Duryea, gasoline.........	6	0	....
Charles Gaither, gasoline.	9	0	....
A. L. Riker, gasoline..........	12	0	....
Gaston Planliff, gasoline.......	4	2	9.30
E. H. Parker, gasoline.........	7	2	6:00
E. A. Riotte, gasoline..........	7	0	....
Automotor Co., gasoline......	12	0	....
H. W. Whipple, gasoline......	24	0	....
Walter E. Evans, gasoline.....	10	0	....
R. S. Davis, steam.............	4	0	....
Fred C. March, gasoline.......	12	1	2:30
J. S. Bunting, gasoline.........	10	0	....
H. M. Wells, steam............	4½	0	....
Leonard D. Fisk, gasoline.....	12	0	....
James Roosa, steam............	9	0	....
J. Murray Page, steam.........	4	0	....
J. F. Newcomer, gasoline......	5	0	....
H. H. Brown, gasoline........	12	1	30
R. D. Willard, gasoline........	10	1	2:18
C. K. Raymond, steam........	9	0	....
H. B. Joy, gasoline............	2	1	3:00
George L. Weiss, gasoline.....	12	0	....
G. S. Martin, gasoline.........	16	1	2:30
C. B. Grout, steam..............	6½	0	....
W. J. Gould, steam............	6½	1	5:00
Otto Westeno, gasoline........	6	0	....
Karl A. Grout, steam..........	6½	0	....
Charles Sheppy, gasoline......	5	1	7:00
S. G. Averill, gasoline.........	8	0	....
F. W. Aurig, gasoline..........	15	4	12:00
F. L. Dodgson, steam.........	4	0	....
Charles Brown, gasoline........	4½	0	....
F. L. Thomas, gasoline........	9	0	....
F. J. Holley, steam.............	4	0	....
Elmer Apperson, gasoline......	16	1	1:20
K. Foster, gasoline.............	9	3	3:00
S. T. Davis, Jr., steam.........	10	4	1:00:00
Dr. J. F. Hovestadt, gasoline.	6	5	50:00
Edgar Apperson, gasoline.....	16	2	40:00
Henry Guillard, gasoline.......	16	0	....
J. E. Mechaley, gasoline.......	6	2	30:00
H. L. Newton, gasoline........	5	0	....
Dr. M. A. Carman, steam.....	4	5	1:30:00

INCIDENTS AT THE HUB.

There were a number of little incidents at the Boston finish which were interesting. Car C 76, which had been back firing in the muffler all the way from New York, sped up to the control and stopped just as an extra large explosion occurred. The crowd thought the machine was about to blow up, and there was a general stampede for a place of safety.

Car 46 finished in good time, despite the fact that a crank shaft had been broken when near the Hartford control. This was most skillfully repaired in record time.

F. A. La Roche, with his Darracq, which broke a piston on Spencer Hill, also put in an appearance on Sunday, having sent to New York for a new part in time to join the run again.

PUSHED INTO THE CONTROL.

Car B 75 was pushed into the control by its operator and observer, who had furnished the motive power for the last eight blocks of the run. The gasoline had been all used up in loafing along the road and killing time in order not to get in too early.

The motor of car A 71 stopped when the machine was within 20 feet of the control. The operator had been running along slowly with his motor cut down to its lowest speed and had thrown in the high speed clutch without speeding it up. After wasting a minute or more, which was charged against him, he gave up the attempt to start the motor, and he and the observer

pushed the car through the control and into the garage.

The policing of the last control was the best of the run.

SOME ATTENDING TOURISTS.

Among the unentered cars which accompanied the run all the way from New York were a 24 horse power Panhard, owned by Mr. Woodworth, of Rochester, N. Y., who had as his guests F. G. Webb and Percy Webb.

The contest committee, Messrs. Scarritt, Chamberlin and Hill, came through in the former's autocar. President Shattuck, of the A. C. A., operated his Panhard. C. R. Mabley and wife, of New York, also came through in a high powered French machine.

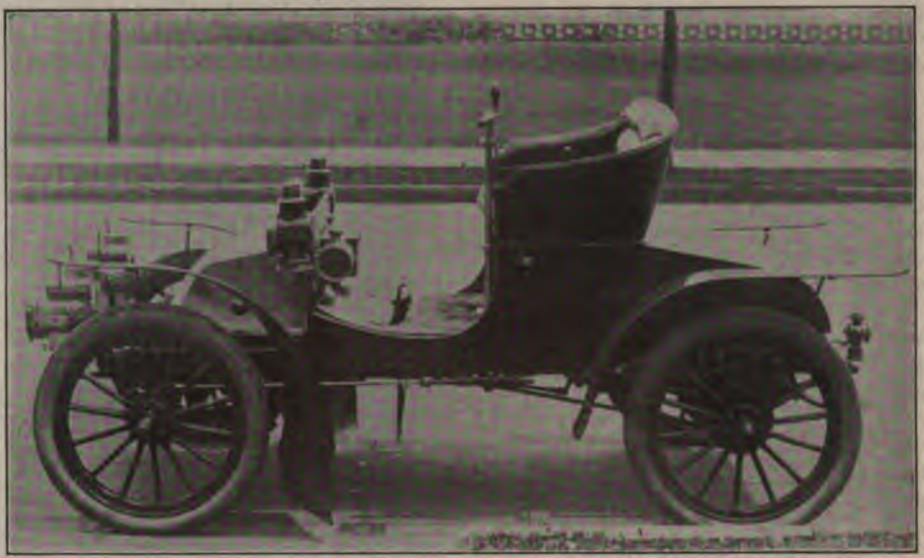
I. W. England and wife, of Passaic, went through in their 16 horse power Peugeot. Harry Fosdick showed the way into Boston with his machine.

ENTERTAINED BY THE MASSACHUSETTS CLUB.

Saturday night the contestants, observers and others on the run were tendered the freedom of the Massachusetts Automobile Club house on Boylston street. There was a smoker and a general good time. Invitations were also distributed for a theatre party and smoker to be given by the Stevens-Duryea Company at Springfield on Monday night. Very few of the contestants took advantage of the garage being open on Sunday morning to make repairs, no doubt being too tired to bother about it.

AMENDMENTS DISCUSSED.

A number of them went out with their officials observers in the afternoon, despite the rain. A special meeting of the club was held Sunday afternoon for the purpose of discussing amendments to the rules, a number of the contestants desiring to start at 8 o'clock in the morning instead of at 9. The hour of starting was changed, leaving it optional with the operators to start at 8 if they pleased.



THE NEW AUTOCAR RUNABOUT B 13 AND B 14.

The Return.

Tired out, but still happy and jubilant, the automobilists who had successfully competed the first half of the six day reliability run spent Sunday in Boston seeing the town, and almost to a man were abed and asleep early Sunday night in order to be prepared for the start toward New York on Monday morning.

Car A 54, the little De Dion, which was considered done for good, came "limping" into Boston late Sunday afternoon. The operator and chauffeur had stuck to the wrecked machine, despite the fact that it appeared to be a hopeless case.

When the knuckle joints gave way the car dropped to the ground and all the connections on the water cooler were smashed. The steering rods were bent into a figure S and the machine seemed to be reduced to junk.

Not at all disheartened, Dr. Hovestadt and his observer secured an empty beer keg and using it for a jack the machine was lifted up, and while the observer did what work he could the doctor went to Boston at once on a train and secured new knuckle joints and other necessary parts and fixed the car up so that he was able to go through and reached Boston with difficulty. The car is not to continue the run, and the observer was assigned to another machine.

OBSERVERS QUIT.

Secretary Butler was given considerable concern today when a number of observers threw up their assignments and quit. New men were secured to take their places with difficulty, and it was my good fortune to be assigned to C 43, a Packhard, a 12 horse power four passenger tonneau touring car, weighing 2,000 pounds.

It is to be regretted that the men originally assigned did not continue, and it is generally believed that the greater number of them had no reasonable excuse.

Notices were posted at the Copley Square Hotel to the effect that in the future all machines will have the option of starting at 8 o'clock each morning, if they so desire. This announcement was received with delight by the contestants, as the cars are invariably brought out of the garage at 7 o'clock each morning and stand in line until ready for the start, the majority of the repairs being made in the open, under the eyes of the official observers.

Despite the threatening weather and the rain on Sunday, which undoubtedly caused the desertion of the half dozen or more "kid glove" observers who quit the run, Monday morning dawned bright and clear and there was every prospect of a pleasant run on the first day's trip toward New York.

All the machines were lined up before the Harvard Automobile Station No. 2, the official garage, promptly at 7 o'clock, resolved to take advantage of the club's ruling, allowing an early start.

All the cars which had finished on Saturday were out in good form and the operators, all glad to be on the homeward course, made their preparations, and at the appointed hour had their cars ready for the start.

The motors were all started and tried, and before 8:20 every one of the machines had left the baked beans town and was speeding on toward Worcester.

The machine on which the writer was observer, C 23, left at exactly 8:6:45.

The car worked well on the start, but seemed to be a bit weak on hills, it being necessary to shift the gears, even on some ordinary grades, but when on the high speed she ran easily and smoothly, developing a speed up to 35 miles an hour.

Besides our four passengers we carried at least 200 pounds of baggage, tools and extras, and at times the single cylinder, 12 horse power motor which propelled us had all it wanted to do.

One feature of the machine which was particularly admirable and desirable was the throttle governor on the gas, and also the automatic spark governor, which insured perfect ignition, and also a great saving of gasoline.

When near Chestnut Hill we had our first difficulty when the motor which previous to this time had been running smoothly and quietly suddenly began to pound, and, losing power, threatened to stop.

Benjamin Smith, the operator, kept his seat while Mr. Hitchcock, the mechanic, standing on the step of the machine, pumped gasoline by hand and kept the engine running for a few minutes longer, and temporarily avoided a stop.

The machine seemed to pick up after this and we ran on in good shape, taking advantage of all the down grades, on which the car proved to be a most excellent coaster, owing to the fact that the gasoline is cut off automatically and the engine does no work and is turned over by the motion of the car, the gear still remaining engaged.

At Natick we passed B 51, which was

stopped for water, and later at South Framingham sped past car B 33, stopped for the same cause.

A CORDIAL RECEPTION.

It is worth noting here that this run has demonstrated that the much reported prejudice against automobiles in the country districts is more of a myth than anything else. In most every country town we passed through the residents turned out in force and gave us a royal welcome. The schools were let out and the children lined the streets and cheered the passing autos. It was an entirely different arrangement from the shotgun receptions on which the yellow journals love to dwell.

In many places women and children stood along the roadside with baskets of apples which they threw to the automobilists as they passed.

COLLISION NARROWLY AVERTED.

When just outside of Framingham, on a narrow country hill, what might have proven a very serious accident was very narrowly avoided.

Oldsmobile No. A 41 attempted to pass C 10, the Haynes-Apperson surrey, on a slight grade, the smaller machine coming up from the rear and attempting to run by on the right side of the surrey.

Mr. Haynes, who was operating the latter vehicle, did not see the Olds, and suddenly veered to the right, pocketing 41 between it and the steep bank. By jamming on his brakes the Olds operator escaped what would undoubtedly have proven a very serious collision for him. An inch more would have been enough to have locked the wheels of the two vehicles together.

STALLED BY CARBURETOR TROUBLES.

At 9:45 o'clock while going down a slight grade just outside of Northboro our motor suddenly began to miss explosions and lose power. It gave every evidence of being about to stop, and our mechanic made haste to get on the step and, removing a side panel, he held his hand over the suction screen, thus making the engine suck more gas. This helped things a little, but the motor, with a final jump and gasp, stopped, and the car was stalled.

The brakes were set to hold it in position, and we all piled out on the road. Mr. Hitchcock, the mechanic, was of the opinion that the trouble was caused by getting water in the carburetor. He looked about for a time, and then pumping some gasoline by hand gave the motor a turn and it started.

We got in again and the machine was started and had enough power to coast down the hill and cover about four city blocks on the level, when it again stopped.

This time the carburetor was taken off and then the trouble was located. The pin holding in place the movable arm on which the float works as it raises up and down had slipped out and the float did not work and consequently the motor did not get any gasoline and could not run.

It took ten minutes to put a new wire in, and before starting the mechanic wanted to tighten the chain, and in making the adjustment the bolt locking the distance rod snapped off short. More wire was used to prevent the screw adjustment from slipping, but this was ineffectual, and we had no end of trouble and lost considerable time.

This was finally fixed at the Springfield control, the broken bolt being bored out and a new one put in its place. We also had a short stop, occasioned by losing our road, it being necessary for us to turn around and go back for a short distance, only to find that the road we had thought was the wrong one was the right one after all.

Shortly after 11 o'clock we passed machine A 41 stopped by the roadside and evidently having ignition troubles, judging from the manner in which the operator was working.

While going up a big hill near Worcester our gear change lever jammed, and we were unable to engage any of our gears. This occasioned a stop of one minute and fourteen seconds until the clutch lever could be freed.

At Warwick C 18 was stopped by the roadside for repairs, but it was impossible to ascertain what the trouble was.

We reached the Worcester control in due time, and while there noted that a number of the machines were in need of repairs and adjustment, the run having been a hard one.

THE WORCESTER CONTROL.

Shortly before 1 o'clock the start was made on the Worcester-Springfield stage of the run, which was considered the hardest of the whole course.

The scenery in this section through the mountains was beautiful beyond description, the many hued leaves turned into a perfect myriad of colors presented an appearance such as can be seen only in the fall of the year. Red, blue, green and all the hues of the rainbow were to be seen blending in the leaves of the thousands of trees which covered the mountain sides and peaks.

The day was a clear, sunshiny one, and the scene was one that would have thrilled the heart of any lover of nature's beauties.

AT SPRINGFIELD.

The city of Springfield has many automobile interests and much was done there to entertain the officials and contestants during their passages. The Nelson Theatre orchestra and boxes had been engaged by the J. Stevens Arms and Tool Company for the officials of the contest and the contestants, and after the performance the same company gave a smoker at the Hotel Worth. The performance of "Fiddle-Dee-Dee" was apparently greatly enjoyed, and when the prima donna gave a dance to the tune of "In the Good Old Summer Time" the New York representative of a leading manufacturer, who is said to have been a footlight favorite at one time, hopped from the box he occupied on to the stage and joined in the dance, which aroused much applause. The German comedians had a few "specially prepared" automobile jokes for the evening. Between acts President Scarritt was called upon for a speech, but as someone from the balcony exclaimed they had come to see the show, Mr. Scarritt refused.

At the smoker the attendance was treated to a lunch and then followed a series of short addresses. President Scarritt, of the A. C. A., was the first to speak. He called attention to the remarkable showing of the vehicles in the contest so far, and compared the results with those of the recent English contest. He said that if the vehicles kept on running as they had

PRESIDENT SHATTUCK, SECRETARY BUTLER AND GEORGE F. CHAMBERLIN AT THE WORCESTER CONTROL.

B 70, FOSTER, FIRST STEAM MACHINE AT FINISH.

o far, the committee would have the t task of awarding four cups to ve- among thirty or more with perfect s. A number of the speakers d the J. Stevens Arms and Tool ny for their hospitality.

AT HARTFORD.

een Springfield and Hartford the re such that an average speed of s an hour can easily be maintained, actically all the vehicles arrived in e succession as they had started. were few troubles to report. The was in the heart of the city, and as a large crowd along the curbs h the machines arrive and to ex- hem at close range at the control. d is a beautiful city, with fine resi- istricts on the outskirts, and after the city limits there are many fine f more or less hilly country, where reaches to immense distances. Ow- the fact that the morning trip was miles in length, most of the con- arrived at Hartford before 11 a. m. hotel where the officials and the ob- had their lunch the dining room ened at 11:30, and for this reason p at the noon control was here in- from one and one-half hours to urs, the first vehicles being started t 1 o'clock.

THE NEW HAVEN CONTROL.

New Haven also large crowds d the sidewalks near the control. The leading vehicles arrived at about 4 p. m., in close succession, running when close to the control at a very slow pace to avoid getting in ahead of time. By 5 o'clock five vehicles were still missing, including the Torbensen, Riker and Davis steam racer. The Torbensen and Davis came in before 6. The Torbensen reported tire troubles and a broken water pipe, and the Davis, tire troubles only, as usual. Riker is said to have come in only a little after 10 o'clock.

AT NORWALK CONTROL.

Nearly all the machines reached the Norwalk control before half past 11, having made the 35 miles from New Haven in good time and with very little trouble. Very few of them showed any signs of their long journey.

There were no repairs to speak of made during the noon hour. One Rambler was noticed trying to reinforce the rear axle by trussing it with wire. C 59 was delayed by replacing the right rear tire, and left at 1:38.

THE FINISH AT NEW YORK.

On the morning of the last day of the contest printed slips were distributed to the contestants announcing that in the afternoon no contesting vehicle would be allowed to pass the club committee's vehicles, two in number, which would be recognizable by pennants bearing a large C. Disregard of this rule would result in disqualification. The committee acted wisely in this respect, for without this rule the contest for first arrival would undoubtedly have resulted in racing within the city limits. As it was, there was the usual scramble for first place when the vehicles neared the control. The committee's vehicles passed the control at 4 o'clock sharp and they were followed closely by the two Stevens-Duryeas, two Oldsmobiles, a Knox, Darracq, De Dion, Elmore and Foster. Fifth avenue was crowded with sightseers from Seventieth street down to Fifty-seventh street, where the observers gave up their record books and the vehicles were released. Over 90 per cent. of the vehicles that started arrived within a half an hour. Two were towed into the control, the Fiat, of C. H. Tangemann, which had a broken gear case, and a locomobile, which had run short of water and in consequence sustained some accident.

Of the seventy-five vehicles which left New York on the 9th, sixty-eight arrived on the 15th, certainly a very creditable result. The following vehicles, according to their operators, had no penalized stop during the entire run:

B 70—Foster.
B 30—Stevens-Duryea.
B 31—Stevens-Duryea.
B 47—Knox.
A 63—Oldsmobile.
B 24—White.
B 25—White.
B 26—White.
B 27—White.
B 11—Haynes-Apperson.
B 68—Fredonia.
B 51—Stearns steamer.
C 42—Fournier-Searchmont.
C 76—Fournier-Searchmont.
C 1—Packard.
C 3—Packard.
B 60—Grout.
B 61—Grout.
B 5—Prescott.
B 7—Lane.

The first six vehicles came in in the following order: B 30, A 63, B 47, A 64, B 44, B 31. The official results are of course not yet known.

It is stated that the White steam machine which made the records at Glenville Park, in Cleveland, September 16, was not begun until about two weeks before the races. The regular stock engine drove the machine, but the steam generator was of necessity of much larger capacity than the regular design, while the frame was of regular build. The body was built especially for the purpose. The machine was completed about two hours before the races were scheduled to commence. It ran immediately to Glenville and warmed up on the track. It was disabled for a short time by a gasoline pipe getting clogged, this being soon remedied, however. The White people are confident that they could make even greater speed were they to build a machine with as low a centre of gravity as the prevailing types of gasoline machines possess.

REPORTS OF OUR OFFICIAL OBSERVERS.

B 28 White Delivery Wagon.

FIRST DAY.

The White delivery wagon, B 28, to which I was assigned, I found, as I expected, a very reliable and smooth running vehicle, in charge of a skillful and painstaking operator, Mr. Hughes.

Its operation, during the entire day's run, was absolutely uneventful. We made not a single stop and reached both controls as nearly as allowable in the minimum time. No supplies were taken on during the day, with the exception of 5 gallons of water at the noon control and about 2 gallons at the garage. The day's gasoline consumption was 7 gallons, which was supplied at the night control. Absolutely no repair or adjustment was made during the day. The operation of the White contrasts most forcibly with that of other steamers upon which I have ridden, in the fact that there is no water gauge to be constantly watched. The operator seems actually to have nothing to do but to steer and to manage the throttle, as the control of the fire and of the water supply is perfectly automatic. Occasionally it is necessary to pump by hand a little oil into the cylinder, and it is perhaps a little surprising that this operation is not performed by some form of mechanical lubricator.

AN EXAMPLE OF RELIABILITY.

This wagon rides much easier than I had anticipated and one is well protected by the hood from wind and dust. Its steaming qualities are most excellent—the pressure hardly dropping below 250 pounds, even upon the worst hills. At no time was it necessary to use the hand water pump, as the power pump appeared to furnish an ample supply, even upon the steep hills where a long cut off was sometimes used. In one instance, upon a severe grade, the condenser was cut out and the engine allowed to exhaust into the air, but at other times the condenser took care of the exhaust perfectly, there being no steam visible with the exception of a barely perceptible escape from a little relief cock at the top of the condenser. The day's run was an example of reliability which was decidedly impressive, and the simplicity of the control was obvious. The flash boiler used by the White furnishes a motive power which requires decidedly different handling from that of an ordinary steam rig. The storage of energy in the form of steam is so small relatively to that in ordinary steam vehicles that the automatic actions of the more often and more sensitively than with diaphragm require to take place much the ordinary form of boiler. I have noticed when riding on other steamers a disposition upon the part of the operators to go slow just before reaching a severe hill in order to "bottle up" steam to overcome the grade. With the White this is not practiced. On the contrary, the operator maintains about the same pace over hill and dale and, if anything, seems to "open her up" specially just before attacking a bad hill, possibly with the idea that the slight drop of pressure thus occasioned will be sure to open the burner before the steepest grade and largest demand for steam is reached.

Today's run has been a veritable pleasure trip, under perfect weather conditions. The roads have averaged very good, with stretches of perfect improved highway, models of the road builder's art. There were enough unimproved stretches to form a striking contrast with the perfect macadam and make one appreciate it.

We saw very few cars stopped, and these for apparently rather trivial causes, and we sighted no wrecks or derelicts, such as strewed the road upon the Buffalo run. Tire troubles seemed the main cause for stops.

SECOND DAY.

The statement has been made by no less an authority than Mr. Dooley that "there's no news in being good," and the truth of this sentiment came forcibly home to me as we jogged uneventfully over the road upon the White delivery wagon, B 28. The performance of the machine is so good there is no news to be reported regarding it.

Before reaching New Haven yesterday afternoon we noticed that the crosshead air pump did not work properly, and so rather than make any repairs upon it we have made use of the hand air pump in today's running.

This morning at the control the only work which we did was the pumping of one tire, filling the cylinder lubri adding a little oil to the crank cas

It is rather hard upon the ope steam vehicles to require them their rigs out of the garage befor may be lighted, but it is doubtless

QUICK STEAM RAISING.

I have been considerably impre the celerity with which steam can on this vehicle. From the time t is applied until the normal press tained can hardly be more than utes.

Today's run has been made single stop and without taking plies en route. At tonight's co took on 7½ gallons of gasoline a 3 gallons of water. There are n of measuring either the gasoline with any exactness, and one is make a rough approximation, esp the case of the water.

NEED OF BRAKE LOCKS.

Our time to Hartford was as the allowable minimum as we make it. The roads were perfec cally all the way, and the ride very pleasant one, although the little frosty. When we lined up ford it was on a slight grade. Th was very perfect, and I noticed ve edly among the machines there sence of one little device with whi automobile ought to be provi brake lock, or means to hold the action when the foot or hand is Very few of the vehicles seeme equipped with any such device, a were forced to resort to trig wheels with jacks, starting cranks movables to prevent their runnin ward down the incline. I ventur that it would not cost over half a

The Haynes-Apperson, Driven by Frank Nutt.

provide a brake lock for any one of these rigs, and its value as a convenience, if not as a safety device, would be very substantial.

ALMOST A STOP.

Our run to Springfield was faultless and our time as good as the law allowed, but with a less expert operator I might have had a stop to record. When nearing Springfield Mr. Hughes noticed that water was spilling about his feet. As our water supply was none too abundant, this matter was instantly investigated, when it was found that the hand water pump had jarred apart and water was flowing out of it. The stuffing nut had jarred off and, as the check valve did not seat properly, the plunger was forced out and the precious fluid was escaping freely. I am willing to take my hat off to Mr. Hughes as an expert operator, for he managed to repack the pump and still keep the vehicle in the road and in motion. It is said that Rossini, when he came to certain impossible piano passages in his compositions, used to play the extra notes with his nose. Mr. Hughes packed the pump with his hands, managed the tiller with his knees, and I believe must have worked the throttle with his teeth. At any rate, a stop was avoided and the day was saved. During the afternoon we sighted our first wreck—that of the Haynes-Apperson runabout. It was sad to see so good a machine helpless in the ditch with both wheels off, and it makes one think of the inherent dangers of self propelled traffic over the common roads at high speed.

Neither at the garage this morning nor at the noon control was any extensive repairing noticed. A few punctures were being healed, lubrication and ignition being looked after, and inspections being made. The comparatively bad roads between Hartford and Springfield and the worse roads yet to come may, however, necessitate more tinkering during the next stage.

THIRD DAY.

My third day on B 28 proved as devoid of excitement as either of its two predecessors. There was nothing to do at the garage in the morning but to attend to cylinder and crank case lubrication, pump one of the tires which had been leaky from the start, clean the spent oil out of the separator which collects it from the condensed water and put a new plunger into the crosshead air pump. This latter is the only real repair which has been found necessary between New York and Boston and, as a matter of fact, we could have gone through without making this by relying upon the hand pump. From Springfield to Worcester we had our first taste of bad country roads—sandy, rutted and hilly. One hill a little beyond West Brookfield proved a severe test upon the climbing power of the vehicles. In ascending it we were forced for the first and only time to use the hand pump to assist the regular boiler feed. Two gasoline cars were seen stalled upon this hill.

Elmer Apperson in His Big Touring Car.

Despite the bad roads we made fine time to Worcester, reaching there just upon the safe side of the minimum time limit without a single stop.

We expected that the hard traveling must have made serious inroads into our water and gasoline supplies, but were pleased to find at Worcester that 4¾ gallons of gasoline and 6 gallons of water were sufficient to make good our forenoon's expenditure. Probably a cool, cloudy day like this causes the condenser to act most efficiently.

The only serious break down which we saw was that of A 54 near Palmer. The little machine was lying in the road with both front wheels flat and the whole front running gear apparently in a bad state of collapse. It is a surprising fact that these smashups often look to be far more serious than actually proves to be the case, and it would not be surprising to learn that A 54 is still on the list.

After again pumping up the defective tire at Worcester, we started upon the last eastward stage of the run, over the perfect roads of this section.

There is absolutely nothing to record of this part of the trip. We say no break downs and our rig jogged along so monotonously as almost to put its crew to sleep. When Boston was near at hand a fine rain began falling, which made the streets rather slippery. Just before reaching the control we were sorry to see B 6 being pushed along the street. We inferred that a scorched boiler might be the cause.

Only once upon this test has any car been noticed running with muffler cutout. This practice is expressly against the rules, but C 76 was certainly heard making "day fireworks."

We reached Boston on schedule time without a stop or incident and we have the proud record of never allowing the carriage to come to rest for an instant outside of the controls in all the distance from New York to Boston. At Boston we took on 3¾ gallons of gasoline and pushed the rig into the garage for a well earned Sunday's repose.

FOURTH DAY.

Before the start from Boston this morning it was necessary to repair our defective tire. The representatives of the tire used upon our machine were on hand and put in a new inner tube and inflated it, but it did not hold, and upon investigation it was found that a wire nail had pierced both tubes, and, upon the new inner tube being inserted, had pierced it also. The nail was extracted and another inner tube put in and we supposed our troubles to be at an end.

Cylinder and crank case lubrication was attended to, the stretch of the driving chain was taken up and the oil washed out of the waste which is used in the separator to extract the lubricant from the returned feed water.

We traveled along very nicely upon schedule time over roads which were somewhat slippery from Sunday's rain, until in Framingham we found that our

TIRE TROUBLES

were not over yet. The same troublesome tire was flat again. We stopped and "jacked her up" and commenced the dirty and weary process of removing lug screws; taking off the outer casing and putting in a new air tube. I know of no operation which differs so much in the theory and practice as tire repairing upon the road. To see the professional demonstrators do the act upon a model wheel at the automobile show would almost convince one that it was a white kid job, to be accomplished in a moment, but the stiff, intractable casing and butterfly nuts which interfere with the wire spokes

are enough to take all the glamour off the best page in any tire catalogue. It is possible, too, that

LIFTING JACKS MIGHT BE IMPROVED;

at any rate in jacking our machine up the thread of the jack was inadvertently screwed entirely out of the bottom portion and let the machine down suddenly, at the same time breaking off the threaded portion, which appears rather frail for the work it is intended to accomplish. Would it not be better to make the threaded portion so that it could not be entirely screwed out of the base? Forty-two minutes were consumed in making this tire repair and we proceeded into Worcester according to our modified schedule, only to find that the tire was again nearly deflated. The obliging tire man was, however, on hand, and not only a new air tube but a brand new casing was supplied, and we naturally assumed that the incident must at last be closed.

After taking on about 8 gallons of water and 5 gallons of gasoline we started rather late for the Springfield control. When a little way out from Worcester a glance at the "hoodoo" wheel showed that we were booked for more trouble, and eight minutes were consumed in pumping up the new but leaky tire. We hoped that we could make the control without repeating the labor of the forenoon, but when West Brookfield was reached the wheel was again running upon its rim, and we were forced to make a repair. The casing had crept around the rim so that it had ruined the nipple and valve by bending them out of shape, so we went through the process of supplying a new air tube, and after a stop of one hour were again upon our way. This time the tire held much better. Whether there is a protruding spoke in the rim which makes the trouble or what is the difficulty, we hope to find out later, and we propose hanging a rabbit's foot on that wheel for the remainder of the run.

A STOP AT LAST.

In his anxiety to make a start after this delay, the operator unfortunately started the vehicle before we had sufficient steam, with the result that we soon stalled upon the grade and had to wait about four minutes for power. The operator is ready to admit that this was his fault and not any defect of the machine, but nevertheless it makes a blemish upon the hitherto spotless record of B 28 to the extent of four black marks.

Certainly the tire is the skeleton in the closet of the automobilist, and it and ignition troubles are enough to take the sunshine out of his life.

Shakespeare, in expressing the limit of perilous and vain uncertainty, says something about "little wanton boys that swim on bladders." Had he lived in the horseless age he might have substituted for this remark an allusion to the wanton automobilist who rides on pneumatic tires without weakening the idea desired to be conveyed.

We arrived at Springfield in the dark and filled our tank with 5¾ gallons of gasoline. Contrary to expectations, we saw no wrecks on the road and very few vehicles stopped. This was partly due, probably, to our being so late. One or two bad hills must have made hard work for the vehicles. On one of them we were forced to use the hand pump, give the engine steam for the full stroke, and cut out the air condenser. The vehicles which we did notice in trouble seemed to be delayed by tire and ignition difficulties. All through the day our own carriage has behaved splendidly, and we have not had a single instant's stop attributable to it since leaving New York.

FIFTH DAY.

Today's run has proved a rather easy and pleasant one, and B 28 has acquitted herself splendidly, going through in good time and without a single stop. The roads from Springfield to Hartford were quite bad, soft and deeply rutted, and in one place were nearly impassable, due to the construction of the State highway. The machines came through beautifully, however, and we saw no wrecks whatever and very few vehicles stopped. The afternoon's run to New Haven was over very good roads and things went admirably. One light gasoline rig was seen with a broken piston and another gasoline vehicle was stalled by the roadside, apparently on account of a hot engine.

We took no supplies at all at Hartford, but at New Haven our tanks required 6½ gallons of gasoline and 4 gallons of water. We had absolutely no trouble during the entire day and the machine operated like the finest clockwork. The steaming qualities of the rig are remarkable and we have not had to use the hand pump at all, except at starting.

A GLANCE AT THE NEWCOMERS.

There are quite a number of vehicles in the test which are newcomers in these competitions and are of some interest. First and foremost, for downright sensational effect and general impressiveness, is C 1, the 24 horse power Packard. The hubs of this ponderous machine are the most sporty things in the whole show. They project at least a foot beyond the wheel and are of a proportionate diameter, and one can imagine the stupendous destruction which would result if two of these magnificent vehicles should try to pass on a narrow country road and accidentally "lock horns."

The J. Stevens Arms and Tool Company have made their first appearance as endurance run contestants, with a very quiet and powerful gasoline vehicle, equipped with an opposed cylinder motor. C 34, the touring car of the Locomobile Company, a great white steam vehicle, attracts considerable attention from passers-by. Much interest centres in the four cylinder vertical air cooled motor which drives the car of the H. H. Franklin Company, and the neat and smooth running gasoline vehicle of the Fredonia Manufacturing Company is an addition to the list of competing vehicles.

There are also some interesting vehicles on the road, but not as contestants. The Lemp steamer, the product of the General Electric Company, has been following the procession today. It has several novel features—a Renold silent drive, the Lemp steering check and an engine of peculiar construction. A strange three wheeled vehicle has also been along, carrying advertising pennants, and, I fear, violating the speed laws of three States.

SIXTH DAY.

The last day of the test appeared to be hailed with considerable joy by all concerned in the run. There is considerable strain involved in carrying out a test of this sort, and it begins to tell upon the men after the first few days.

Everyone was very early at the garage this morning, and everyone appeared to be anxious to secure first position in the line.

We did absolutely nothing to the machine save to lubricate the chain and fill the cylinder oil supply, and have today made a perfectly clean record, both forenoon and afternoon, and have taken on no supplies whatever. The only stop which we were forced to make was for a railway train, which is, of course, non-penalized.

We expected to pass very few stalled vehicles today, as the roads were mostly good, and we assumed that the contestants would all make particularly strenuous efforts for clean records. On the contrary we noticed more vehicles stopped along the road than on any previous day.

There were no wrecks, but there seemed to be a good many of the less serious class of derangements, and these appeared to be mostly confined to the gasoline machines. There were one or two cases apparently of tire trouble, several of them we inferred to be ignition difficulties, one looked like a case of "hot engine," and there were several that we could not satisfactorily diagnose in our rapid passage.

One of the foreign machines which has hitherto made a fine record was noticed stalled on Fifth avenue, and one representative of an esteemed American make had a wheel off at Bridgeport; another of the same manufacture required the services of its crew to push it along on a grade near Westport, while yet another of this make was stalled at Savin Rock.

Upon a hill just out of Stamford there were the elements of a bad smashup. One of the heavy gasoline rigs failed to mesh its gears promptly and was not controlled quickly enough by the brake to prevent its running backward into a closely following gasoline car, but without any serious damage which could be discerned.

At the noon control one of the very light gasoline rigs was noticed strengthening its weakened rear axle with iron wire, and an example of a temporary spring repair was noticed upon one of the foreign cars. Some

: repaired at Norwalk and igni-
ılties corrected.
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ingle adjustment was required
Upon three of the worst hills we
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checks, as the water has become
dirty, and nothing has been
ıny part of the water feed ap-
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REMARKABLE PERFORMANCE.

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It is rather surprising to find a
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r taken during the trip has been
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y taken on there was not obtaina-
s is regrettable, as the figures
ubtless have been interesting and
wn a highly advanced state of

ALBERT L. CLOUGH.

On A 71.

FIRST DAY.

De Dion motorette, on which the
ed as official observer, was one of
o leave the starting place at the
ew York, the exact starting time
3. The route for the first 50 miles
iar, being the same as in the 100
ırance contest on Decoration Day
e vehicles were started at very
rvals, and, as the wind was blow-
tly against us, it became almost
ly dusty when we got into the
road. The leading vehicles kept
for a considerable time, but finally
arated more and more, and in

THE THREE SEARCHMONTS.

Fordham the road had just been sprinkled and we began to enjoy the jaunt through the autumnal landscape. Near Fordham we overtook the first vehicle stalled, A 41, but the reason of its distress could not be learned.

Shortly after, having passed the New York city limits, we began exercising our heads with mental arithmetic. Sheets had been distributed to all the vehicles while in line for the start, announcing a change in the rules to the effect that a range of ten minutes on either side of the time, corresponding to an average speed of 14 miles an hour, would be accorded contestants; that is, if they arrived inside of ten minutes less than the recorded minimum time they would not be disqualified, and unless they exceeded the minimum time more than ten minutes no marks would be deducted from their reliability marks for having failed to make the required average speed. This change certainly greatly lessened the worry of drivers and observers, but the limits were still narrow enough to require frequent and close calculation and timing.

A DANGER SPOT.

Near Bartow there is a sharp descent to a railroad crossing, and after the tracks are crossed there is a steep ascent. This place is marked "Danger" on the maps, and there is a danger sign on a pole where the descent begins. This sign one would ordinarily take to refer to the crossing, as a warning to drivers to look out for trains; there is another source of danger at this place, however. Just after passing the track one comes to an extraordinarily deep "thank'ee ma'am" across the road, which gave all the vehicles a severe bump. When we had made sure that there was no train in sight we ran across the track at a fair speed, and when the wheels dropped into this cross gutter it jolted the machine so badly that some of the cooling water was thrown in our faces. The peculiar thing is that such a defect as this is allowed to exist in a road forming a part of an otherwise almost unsurpassed boulevard. It is not unreasonable to assume that the damage done to every vehicle that passes over this gutter at a fair speed—say, 8 miles an hour—is as much as it would cost to have the gutter filled up.

DANGER OF "BUNCHING."

Several times when trying to "rush" a hill, or in coming down a hill at a fairly good speed, our vehicle got into a "bunch" with others. The writer, as a consequence of former experience, is convinced that it is unwise for a driver in an endurance contest to get too close to a number of other vehicles, especially if he is driving a gasoline vehicle. Our first and only stop in the first section of the contest was due to this cause. At the foot of one of the long hills we were proceeding closely behind two Packard machines. The De Dion the writer was on is a 6 horse power weighing about 900 pounds, and, being geared comparatively low, had climbed all hills so far on the high gear. When we came to this hill the Packards ahead of us changed to a lower gear (these vehicles being equipped with a three speed gear) and one got abreast of the other. As we continued on the high gear we were soon at their heels, and, as at this same time a horse vehicle came along in the opposite direction, the road was practically blocked, and the driver of the De Dion was forced to throttle down his engine and change the gear. This stalled the vehicle. The driver let it run back into the bank at the side of the road, ran back to the foot of the hill, and then climbed it with ease. Running back to the foot of the hill and up again to the point where the stop occurred occupied just one and one-half minutes. Whether this stop will be penalized or not I do not know.

Just through Stamford we passed C 34 stalled, with one flat rear tire. We arrived at the noon control, Norwalk, at 12:14½, just on time to the minute, if the one and one-half minute stop is deducted.

After lunch the motor on one of the De Dion machines (54 A) refused to respond to the cranking, and the driver of my machine assisted the driver of the other in looking for the trouble, which accounted for our starting well toward the end, at 2:02. It seemed that most of the drivers kept up a very good pace just after

leaving Norwalk, but there was no sign of racing. There are many hills of considerable steepness at this part of the route, and some time had to be made up in running down hill and on the level for what was lost on up grades.

DIRTY SPARK PLUG.

Our journey continued uneventful until, when about half the distance was covered, the motor suddenly became irregular in its operation and the car began advancing with spasmodic impulses. This was shortly after the driver had added to the oil supply in the crank case. The fault was at once correctly diagnosed as "dirty spark plug," but the vehicle was kept going until it stopped of itself. It was all the while running on an up grade, which, of course, hastened the complete stoppage of the motor and the carriage. The job of taking out the plug (which was completely black with soot), replacing it with a new one and getting under way again took exactly 2½ minutes, certainly a creditable performance. With the new plug the engine ran faultlessly again, and we reached the night control, New Haven, at 4:54, or 1½ minutes after our minimum time had elapsed. To prevent getting in too early we had to do some "loafing," however, for the last few miles.

For the 34.5 miles of this second section our vehicle consumed practically three gallons of gasoline, which amount was taken on again at the night control, and had to be paid for at the rate of 18 cents a gallon.

Shortly after our arrival Dr. Hovestadt, with the De Dion A 54, also arrived, having had no trouble in this section, after having succeeded in starting the engine at the noon control. K. A. Skinner, who drove the third De Dion machine in the run, told me that he had had no trouble in either stage today.

J. Frank Duryea forgot to turn on his gasoline at Norwalk, which caused a stop of one-half minute. A 61 we passed stalled near Milford. The driver was cranking the engine. The driver of Rambler No. 75 told me he had had no stop during the day.

SECOND DAY.

According to rules, the operators were admitted to the garage at 7 a. m., and at the same time the official observers were to report, so they could make note of any repairs, replacements, etc., made during the two hours to the start, which was to begin at 9 o'clock. At New Haven this rule was not complied with by the observers, chiefly because of insufficient hotel accommodations. Some of them had to wait in the hotel dining room fully one-half hour before their breakfast was served them. After 7 o'clock operators and observers were admitted to the garage as they arrived, and in many cases the observer arrived later than the operator, so that the former could not possibly have seen all that was done to the wagon.

The garage presented quite a busy appearance from 7 to 9 o'clock, but in almost every case the work was limited to adjusting, cleaning and oiling parts, no serious repairs being made. The driver of A 71 simply cleaned the intake valve, trembler and spark plug and oiled all the parts.

A 71 started at 9:11½, after most of the other vehicles had gotten away. While still within the city limits of New Haven we passed A 19 stalled. Except for a short stretch of sand, the roads were fine all the way to Hartford. In spite of this there seemed to be more cases of trouble than on the previous day. B 37 was passed at 9:40, stalled, and with the bonnet removed. The first serious mechanical accident was noted a little later on, when B 12 was seen at the side of the road with the two front wheels lying flat on the ground and the front part of the body down. At this part the road was perfectly level, with an exceptionally fine macadam pavement in the middle, but with a pronounced rounding and soft ground at the sides. An eyewitness described the accident as follows: The driver of B 12 attempted to pass a vehicle ahead of him without giving warning; he went away over to the side, got into the soft, sandy ground and broke the axle ends or knuckles.

We also passed A 54 with a big cut in one of the rear tires. This same vehicle a little farther on had the misfortune of running over a dog and breaking a steering knuckle, when the wheel struck the ground again. A repair shop was handy, and in one hour and forty minutes a piece was forged to replace that part of the knuckle which was broken, the knuckle on this vehicle being made in two parts. While the vehicle was late at the noon control it arrived at the night control in time.

BAD ROADS AND TRAFFIC OBSTRUCT

A stop of one and one-half hou made at Hartford, right in the b part of the city, and then the tri tinued to Springfield. This section shortest of all, being only 26.4 m length, but it comprised the worst st of road that we have had so far. I tion "traffic" conditions rendered p of the trip even more difficult tha otherwise would have been to the I was observing on and several At one place a lot of loose earth ha dumped at one side of the road, and usual in such cases, a track had formed at the other side. Just whe began a farm wagon was halting track with several men standing by apparently no other purpose than the "devil wagons" go through th of loose earth. It was a severe tas United States Long Distance ahead and the motorette, but both went th it unflinchingly. A very similar rence we had a little farther on, whe hoss shays" went along at about an hour in the track, which for the the wrong side of the road, and com us in passing them to take the wron which evidently had been very mudd recently, being deeply cut with whe in various directions and dried up roughness subjected the vehicle to severe jolting and caused a sudde crease in speed, but here, too, we through safely.

During the afternoon we passed t lowing vehicles stalled, all having ently some trouble with the machine 16, B 59, B 51.

At Hartford we arrived at 12:1 started again at 1:43½. The cont Springfield was reached at 3:27:30. had no stop whatever in either the noon or the afternoon run, our

ONE OF THE OLDSMOBILES IN THE BUNCH AT THE FINISH.

r the two sections corresponds to imum recognized officially.

ord may here be said in regard to erest of the population along the n the run. In all the larger cities through—New Haven, Hartford, ield—the streets were lined. The apparently everywhere had suspended during the passage, and the school n lined the curb and cheered vociferously as the vehicles went by. In the r people were seen posted along the ther singly or in parties, frequently ewspaper clippings in their hands ntly containing the entry list, and nes with the contest program. At skirts of the larger cities many aules were met, either drawn up along d or proceeding slowly along the n the reverse direction to the con-.

ng the troubles today of which I re the following: The Pierce mahad its first stop today, caused by aking of an intake valve, which took ninutes to replace. A United States Distance machine skidded and colith a street car in Hartford, which e front axle so that the front wheel side makes an angle of perhaps 20° e vertical. The machine continued way and arrived here in good time. go on to Boston as it is. K. A. r had a dirty spark plug this afterwhich caused him to lose a few min-

THIRD DAY.

ng the first two days the weather n sunshiny, but on Saturday mornen the cars prepared for the start ngfield it was foggy and threatened At the first night control the vehid been cleaned, oiled, etc., in the g in the garage, but at Springfield them were pushed into the street upon the opening of the garage m., the garage at this place, the ield Riding Academy, being only rge enough to hold the vehicles. ene in the street toward 9 o'clock e of considerable animation. It erally understood that the hardest n was about to begin and everyanted to have his machine in the sible condition for the task. There repairs of any importance being work upon the vehicles being cleaning, oiling and adjusting ments of such minor parts as plugs, etc.

AD MACHINES MEET DIFFICULTIES.

was given to the first vehicle at 9 a. m. A 71 was among the st, at 30 seconds after 9. The the city that were passed and the roads for some distance he city were good, and most of the ts attempted to get ahead of the e during the first part so as to al- any loss of time later on on the ds of which they had been told. The bad roads soon came; at least 20 miles of this section consisted of narrow, sandy roads with deep ruts and some steep hills. The strain was particularly severe on the many narrow tread vehicles which had to run with one wheel through the deep sand. To this class belongs the De Dion motorette, on which the writer was observing. The driver kept right on, however, at full speed, and the little motor did so well that in spite of the sand we got considerably ahead of the schedule and for some time led the procession. While this had the advantage of preserving us from the dust stirred up by other vehicles it prevented our seeing what happened to some of the other vehicles. There is in this section an exceptionally steep and long hill, and at that place a crowd of curious or interested had congregated to witness the behavior of the different cars. I got out and did some pushing on this hill, but believe that the machine would easily have gone up without it. Since pushing did not count against a vehicle in any case and was expected of the observers in case of necessity it seemed the safest not to wait till the necessity arose. At this place we were even with a privately owned touring car not entered, and noticed that although three of the four occupants were pushing it was stalled momentarily until the engine flywheels could gain momentum.

The last part of the route consisted of good roads again and as we reached Worcester considerably ahead of time we had to "loaf" through the streets at a very slow pace. We were second to arrive, our time being 12:34:15. We had no stop during the morning's trip.

A 71 started again at 2:17:30 when nearly all the rest of the vehicles were off. The afternoon's run was 44.6 miles in length and would be entirely over good roads we had been told. We passed a number of vehicles during the earlier part of the afternoon and then got in line with several others, including another motorette, the Stearns steam carriage, and one of the Whites, with which we ran along for a considerable time. The run was uneventful as far as we could observe, but as we neared Boston the number of automobiles stationed along the road or coming out to meet the arrivals steadily increased. Those automobilists who were stationed at some particular point usually had selected the vicinity of a steep rise for their point of observation.

MISSED EXPLOSIONS.

At about 4 o'clock our motor began to miss explosions, owing no doubt to the spark plug having become covered with soot. The power of the motor fell off somewhat and the low gear had to be used on practically all hills. Several times on the steeper hills I had to get out and push. For a while it seemed fortunate that we were ahead of time, but we were finally again compelled to kill time by "loafing" and the last part was again covered by just creeping along. When we were about 20 to 30 feet from the control one of the officials motioned us to come on as our minimum time had expired. The driver suddenly jerked in the high gear which brought the motor abruptly to a stop and the car stopped a moment later. The crank was applied, but as the effort to start the motor did not succeed at the first few attempts, the driver gave it up and we pushed the vehicle past the control (at 5:19). The time lost was 1 minute. We had no other stop during the trip. During the last part of the run it had been drizzling.

The vehicles were stored for the night and over Sunday in a very spacious building back of the Harvard Automobile Station No. 2.

Drivers, mechanics and observers were admitted to the garage on Sunday morning at 7 to make any repairs, adjustments, etc., they desired. Only about one-half the contestants availed themselves of this privilege and those who went to the station mostly only occupied themselves with the cleaning and adjusting of parts. Among the more serious repairs and replacements being made were the following: B 7 put on a new rear tire; C 42 was fixing the wiring of the engine; C 59 put a sheet steel sleeve around the steering rod (which was evidently fractured), fastening it by clamps and by putting bolts through the rod and sleeve; B 45 put on a new rear tire; A 41 put a new gasket in engine; B 61 put in a new inner tube; C 17 repaired the friction driving gear of the pump; B 6 put in a new pump lever; B 37 put in one new connecting rod.

FOURTH DAY.

At a meeting of the officials of the contest on Sunday afternoon it was decided that on Monday morning the starting was to begin at 8 o'clock instead of 9, so that all of the vehicles that had no trouble might arrive at Springfield before dark. At 7 a. m. on Monday there was a scramble at the garage; every operator wanted to get his vehicle out first, so as to get to the head of the line and be started first. However, they were only admitted if their observers were also present, while, on the other hand, observers also had to wait at the door if their drivers had not yet arrived. The two Oldsmobiles entered by the Olds Company were, as usual, among the first machines out. The driver of A 71 was about ten minutes late, and we were started after about half the vehicles had left, at 8:6:30.

The rain on Sunday had laid the dust and rendered some low places in the road rather muddy. The motorette has very broad fenders close over the wheels, which shielded us perfectly from the mud thrown off by the latter, but a number of the light steam carriages in the run were not thus provided, and their occupants had a considerable amount of mud thrown over them.

As far as my personal observation goes the morning's run was rather uneventful. We ourselves had absolutely no stop and overtook but three vehicles stalled—an Oldsmobile, a Packard and a Stevens-Duryea. The observers on the first two mentioned were HORSELESS AGE representatives, and the cause for the stop of the last mentioned vehicle I have not yet been able to ascertain.

A 71 arrived in Worcester at 11:9 o'clock, or one and one-half minutes after the absolute minimum time had expired. We started again at 12:43, near the head of the procession. The run this afternoon was the longest and generally most difficult of the return journey. We were escorted out of the city by two bicycle policemen. Once out we overtook a number of competing vehicles, and then ran along for a considerable distance close behind the one large steam machine in the contest, there being no other vehicles in sight. Finally another steamer caught up with and passed us, and then the two steam machines were out of sight in a very short time, although our machine, too, must have run at about 18 miles an hour. From then on we were entirely separated from all the rest of the competing vehicles, there being perhaps a dozen ahead of us and all the rest behind, but none in sight either ahead or behind. A steam surrey of very light build, not entered, kept in touch with us for all the rest of the distance. It overtook us in regular running, but was overtaken again when taking on water. It was occupied by a gentleman and two young ladies, who evidently intended to see the finish at Springfield.

WHY THESE DETOURS?

Referring back to the steamers above mentioned, we never saw them again, but as one of them arrived at the Springfield control about a half an hour and the other an hour later than we did, it is plain that they made a detour. Some others of the leading machines also made detours, as was admitted by their drivers. Whether the fact that they were much ahead of time had anything to do with their losing their way I do not know.

When nearing Springfield we overtook a Knox machine and the two Oldsmobiles, which passed us again, however, in the streets of the city. We had to reduce our speed considerably during the last few miles run, in order to avoid arriving ahead of time, and reported at the control at 4:17:30, or again one and one-half minutes after the expiration of the absolute minimum time. We had no stop during the afternoon's run. We only passed one vehicle stalled, C 66, which had lost a bolt out of the ignition mechanism.

SOME REPORTED STOPS.

At the control I learned from the observers or drivers of the following stops: B 61 stopped five seconds, having run out of steam momentarily; B 21 had a ten minutes stop, due to tire troubles; B 31 broke a chain and lost ten minutes; B 35 stopped to pump up tire; B 8 lost a pin valve out of the cylinder lubricator, which caused a loss of five minutes; B 24 had to fix a tire en route; C 21 had a tire puncture and lost thirty-one minutes; B 58 lost ten minutes, owing to trouble with valves; B 70 came in with a rear tire flat and wound with rope; had run 36 miles with flat tire.

B 15, THE 8 HORSE POWER KNICKERBOCKER TONNEAU OF THE WARD LEONARD E COMPANY, BRONXVILLE, N. Y.

FIFTH DAY.

On Tuesday morning the cars again ran over the shortest section of the route, Springfield to Hartford, a distance of 26.4 miles. There were in this section some sandy roads to be encountered and a few fairly steep hills. A 71 was among the first dozen vehicles to start and kept right near the front during the entire trip. The vehicle did not stop during the run and arrived at the noon control fifteen seconds after the expiration of its minimum time. As we were near the head we did not observe any of the incidents of the road. In Windsor, the last station before Hartfort, a street was being paved, and the contesting vehicles were required to run over one stretch of pavement newly covered with crushed stone and not yet rolled, and another, which was still worse, being paved with sandstone, the pieces having mostly very sharp edges, being set on end, and the pavement having not yet been covered with sand. This was certainly a severe strain on all the tires.

Toward the end of the trip, when the leading vehicles entered Hartford, there were eight or ten of them "in a bunch." A contest ensued for the first place in the procession, and ended in something like a race. The result was that when these vehicles approached the control they were far ahead of schedule time, and zigzagging across the street at the slowest possible pace was resorted to kill the time which had yet to elapse. The last street before the control was a very narrow one, and while the machines were there executing this manœuvre one of them, the Fiat, driven by C. H. Tangemann, got in a "pinch" between another vehicle and the curb and had to stop and back out, which must have caused it to lose at least one mark.

...only delay en route of which I learned was that of C 59, which slight trouble with the trembler.

The section covered in the from Hartford to New Haven, good road surface all the way; less, there were quite a number downs more or less serious. the effects of the run were be make themselves felt. The road dried up and were quite dusty

When we had covered abou distance on A 71 the engine squeak and grind, indicating t needing oil. The driver had cautious in regard to feeding plentifully to the engine, as h the loss of two and a half n the first day for replacing a fo plug to having a surplus of crank case. On several of th sections the engine had receive tion of oil en route, although se it ground and squeaked rather

This afternoon, after the engi grinding for some time, it sudd operating altogether. The driver turned the starting crank and kr from the ease with which the en over that the piston was broken curred at exactly 3 o'clock and from our destination, New Ha extra piston was carried it w plain that we would have to b Word of the accident was sent the passing contestants to Kenne owner of the machine, who dr vehicle and had already passed w cident occurred, so he might ma ments for having the necessary fected and, possibly, for havin in. While unable to do anythi took off the cylinder connection removed the cylinder, which is crank case by four stud bolts. that the head of the piston was the line of fracture following ring grooves about half way a running lengthwise for some both sides and finally completin by running through the thin w of the wristpin bosses. At the wall of the cylinder is only sixteenth of an inch thick.

Many of the passing con

quired whether the accident was serious, whether there was anything they could do, etc.—private automobilists and horsemen likewise. Finally our good Samaritan came along in the person of Leonard D. Fisk, of Hartford, who drove one of the competing vehicles, a Panhard, C 66. He at once correctly surveyed the situation and asked whether we wanted to be towed in. The driver of A 71 at once accepted this friendly offer; the Panhard was slowed down, the De Dion pushed up to it and tied to the rear step of the Panhard by a length of clothesline carried on the latter vehicle, making a rather frail tow line. The Panhard had been delayed for one hour by tire troubles, and although it came along after nearly all the other vehicles had passed, it was ahead of its schedule time. The towing was quite successful and we arrived at the New Haven control at about 5 o'clock.

The vehicle was brought to a bicycle repair shop, and a new piston and rings were telephoned for to Boston, where Mr. Skinner carries spare parts in stock. Here the body was taken off and the motor taken out of the vehicle. The motor was taken entirely apart, and it was found that the bushing in the connecting rod at the crank end had been entirely ground to pieces, and the scrap brass was lying in the crank case. The opening for the bushing in the end of the connecting rod had originally been about 1¼ inches in diameter, or about ⅜ inch more than the crank pin, but the pounding after the bush had been ground out had given it an oval shape, about 1 1-16 inches by 1 7-16 inches.

The breaking of the piston was undoubtedly indirectly caused by the destruction of the crank pin bearing bushing. As the crank pin had now 9-16 inch play in its bearing the momentum of the piston on the up stroke carried it so high that the highest piston ring got beyond the offset in the bore of the cylinder and expanded, and the piston was literally torn to pieces.

The most difficult task was to fit another bushing into the connecting rod. Most of the machine shops having closed for the day no piece of bronze suitable in size for the purpose could be obtained. It was therefore decided to fit a tool steel bushing instead. The connecting rod end was first heated in a brazing fire and hammered back to its original round shape; then a tool steel plug was fitted and bored out to fit the crank pin. At about 12 o'clock an employee of Mr. Skinner arrived on the express from Boston with a new piston, which was put in place, the engine connections remade, and the body put on again. The vehicle was assembled again, and the motor tested before 7 o'clock a. m. on Wednesday, when the contestants were allowed into the garage. We then lined up with the other vehicles for the start.

SIXTH DAY.

Wednesday morning A 71 was the third vehicle to start from New Haven for Norwalk, at 9:0:15. The accident of the day before had taught the driver a lesson and he resolved to run as much as possible on the high gear and then throttle the engine so as to run constantly about 14 miles an hour, in order to keep the engine as cool as possible. The result was that during the earlier part of this run we were overtaken by quite a few other vehicles, instead of overtaking others as on the previous days. He also resolved to give the engine plenty of oil and run the risk of fouling the spark plug, which would cause at most a delay of three or four minutes. Owing to a surplus of oil in the crank chamber the engine did not run as steadily as was desirable, explosions missing now and then. But the machine ran along fairly well until on a hill, when the driver changed from the high to the low gear, he jerked the clutch lever over rather suddenly and broke a transmission piece in the clutch operating mechanism. This piece consists of a casting connecting two parallel shifting rods in such a manner that when one rod is moved in either direction the other moves the same way and distance. With this piece broken it was impossible to operate either one of the clutches from the seat. The only thing that could be done was to start the engine, engage one of the clutches from the rear of the carriage and then jump in. It was desired, of course, to go on the high speed, as otherwise much time would have been lost and the average speed for this section been very low, for we were still about 15 miles from the noon control. We pushed the carriage to the top of the hill and then started it in the manner described. The delay caused by this accident was thirteen minutes. On all the steep hills encountered between this place and the noon control we had to get out and assist the motor by pushing, for in addition to the fact that only the high gear could be used the motor was not working perfectly. Before arriving at the noon control we made another stop of five minutes to put in a clean spark plug. We arrived at the control at exactly 12 o'clock, one-half hour after the expiration of the minimum time. Six or seven of the vehicles which had started from New Haxen had not yet arrived by that time.

During the stop at the noon control the broken part was taken to a machine shop, and the two parts bolted together by means of a strip of wrought iron. It was then put in place again, and immediately after the vehicle was started for New York (at 1:15), most of the other vehicles having got away by that time. As illustrative of the tests of endurance a long distance automobile contest subjects the operators to, it may be mentioned that the driver of this car had not had a wink of sleep during the night from Tuesday to Wednesday, and got no time for eating a meal at the Wednesday noon control.

Being started comparatively late, we ran along all alone in the afternoon, and for this reason got twice off the right road. We soon noticed our mistakes, however, and turned back without losing much time. The engine ran fine during the entire run, and we arrived at the end control a few minutes after the expiration of our minimum time. The entire distance from Norwalk to New York is a continuous succession of up and down grades, and it is harder to make a good average speed than on level roads. The roads are for the most part in excellent condition, however. We overtook two vehicles making repairs—A 19 and B 40—and when nearing the control several others, which were proceeding slowly.

The average speed of this vehicle, if the mileage of Tuesday afternoon is deducted, but the minimum time for this mileage figured with, amounts to about 12.6 miles for the entire distance, and it would thus seem that the vehicle will receive a first class certificate. The vehicle, it should be stated, is an old one, having been in use for several years and having covered at least 10,000 miles, according to Mr. Skinner's statement. The particular design is not made any longer abroad. The motor was new and was a single cylinder of 3.6 inches bore by 4 inches stroke.

P. M. Heldt.

Ward Leonard No. 15.

FIRST DAY.

The report has gained circulation that seventy-two out of the seventy-five starters reported at the night control at New Haven. One would expect that they were all here, judging by the general showing made on the road. It may be argued that the roads were good. As a matter of fact they were better than those which the vehicles traveled over in any stage of last year's run. There were plenty of bad stretches, plenty of sand, a little clay mud and "thank you ma'ams" a plenty. The grades were not steep, excepting one short hill somewhere between Port Chester and Greenwich, where several machines were stalled. A number of the occupants of the vehicles which encountered this hill were seen out in the road a-pushing. The first vehicle that I saw stopped was B 45. Evidently the motor had stopped just before the car reached Central Bridge.

At no time during the entire day did the writer see any carriage that was in a bad way. Two or three had tire punctures, among them the large Packard of Harlan W. Whipple, Mr. Davis' locomobile, a Darracq and the Toledo gasoline touring car. No doubt others had tire troubles, but these were less than during a like period last year. Improvements in pneumatics are being made despite the contention that nothing is being done in this direction. One circumstance that accounts for the better, or apparently better, showing is the absence of boards with spikes in them in the road. Last year misguided persons had placed such boards in the road, especially along the Hudson. One cannot fail to observe that the horses in

this section are accustomed to motor vehicles. Even young, spirited animals will stop shying as soon as the motorists call to them when passing. It seems as though nothing that the drivers can do is as likely to allay the fears of the animals as a simple "whoa, boy!" coming from the automobilists.

INTEREST ALONG THE ROUTE.

The procession of self propelled vehicles seemed to make a great impression on the inhabitants of the cities and villages, the majority of whom considered it as a race. The average speed of 14 miles per hour must have been exceeded by a great many, as so many of them reached the controls before the minimum time allowance had expired. The vehicle in which the writer rode could have maintained an average speed of 16 miles an hour just as well as 14. The last 8 to 10 miles were always covered at a rate of that many or less miles per hour. It is remarkable what a showing some of the light, two speed gasoline cars made, but can they be expected to keep up the pace very much longer? The dust raised by preceding automobiles did not interfere with the operations of those that followed to any extent. One of the Packard tonneaus was delayed by cotton waste that had gotten into the radiator. The Ward Leonard No. 16 had to make a stop to clean the spark plug of one cylinder. The other machine of the same make made neither a penalized nor non-penalized stop en route.

The arrangements made by the club were such that everything worked without a hitch—i. e., all the contestants got away on time. Very few of the operators availed themselves of the opportunity of making adjustments and repairs at the noon control. Perhaps most of the cars required no such attention. A few of them may not fare so well in the near future, because that "stitch in time" was not taken.

SECOND DAY.

The roads between New Haven and Hartford and between that city and Springfield cannot compare very favorably with those over which we traveled yesterday. There were fewer "sandpapered" stretches and a great many "thank you ma'ams." The heavy rains had left many gullies, which traffic has not yet been able to fill in, and the wagon tracks were at times of a rutty nature. The standard tread vehicles were not affected much by these ruts, but the narrow tread machines had a rough time of it. Not many of the light gasoline rigs are in the swim any more. One by one they are dropping out.

A HURRIED REPAIR.

There were two breakdowns that seemed to have put the respective vehicles hors du combat, but their operators succeeded in putting them back on the road again in very short order. Dr. Hovestadt's De Dion motorette ran over a dog, but did not hurt the animal. Incidentally one of the steering knuckles gave way—i. e., broke off just next to the hub. Fortunately he was going only at a very moderate speed and within the limits of New Britain, Conn. A mechanic's shop was not far off, and in one hour and forty-five minutes he was back on the road again and enabled to reach the control on time. It may be of interest to some readers to learn how the job was done, and the writer may, therefore, be pardoned for burdening the columns of THE HORSELESS AGE with a description of the way that the job was done. A hole was drilled into the vertical hub of the knuckle and another into the piece that had been broken off. A steel pin was then driven into one piece, and the other part was forced over that part that extended beyond the former. Then the joint was brazed carefully and trimmed, and the work was accomplished.

The Haynes-Apperson B 12 lost about two hours between Hartford and Springfield. To avoid running into a Packard, which was overtaking it and had crowded it over, the operator of B 12 had to swerve out of the way. The front springs came loose and a front wheel was dished, it was said. The driver was thrown out violently, but escaped serious injury. Car No. 65 ran into one of the front wheels of a Rambler while overtaking it. Had the latter been equipped with a locked steering device the wheel would not have been deflected from its course, but crushed. A short distance out of New Haven a Knox was seen at one side of the road with a broken crank shaft. Up to that time it had a spotless record, it was stated. The other Knox entries reached Springfield shortly after the leader. So far they have been identified with the advance guard. The surrey No. B 10 had a puncture during the morning run. B 16, the double cylinder Ward Leonard, stopped a few minutes to secure an admission valve spring. B 15 of the same make made but two stops during the day, both on account of blocked railroad crossings. A 19, the Torbensen, broke a piece out of the inlet valve stem, which had to be riveted over ere the little car could proceed. One of the Pierce motorettes had to replace a broken inlet valve en route also. Good hill climbers among the light gasoline automobiles there are few. The Franklin entry has proven itself to be one, despite the fact that it has but two speeds and a reverse. It has a four cylinder motor of about 3½ inch bore and 4¼ inch stroke. All the cylinders and heads are air cooled.

It seems that a number of the contesting carriages reached the night control a little ahead of time—not much ahead, only thirty seconds to a minute. That it is no easy matter to figure out the distance between a given point before reaching a control and driving at a speed that will entitle the car to an average speed of 14 miles per hour, the participants all know.

THIRD DAY.

Saturday's run was the longest so far, but neither the machines nor their occupants suffered in the least on that account. All of the latter were a little stiff on arrival at controls, but otherwise fresh. The roads were much better than those of Connecticut, and the grades, with the exception of two severe hills, did not give the engines much trouble. Foster Hill was the steepest encountered during the whole run from New York and quite a few cars were in need of the assistance which the observer was permitted to render to the operator. In one case five men, all of whom were occupants of the particular carriage, were seen pushing. It was stated that all the steam vehicles ascended Foster Hill without assistance of any kind. None of the gasoline cars were obliged to climb up by means of their backing gears, which was the only way that some of the little fellows could manage to reach the brow of Nelson Hill last year. There were no teams on hand on Saturday to do what the motors failed to accomplish, and despite their absence none of the automobiles failed to reach the summit, though it appears a number of them were stalled for a time about half way up. The other steep hill was not long, but it had a sharp turn in it and made great demands on the engines.

During the morning's run all the contestants drove their cars at a fair average speed over the good roads between Springfield and Worcester and arrived there on time. The only breakdown on that run was that of Dr. Hovestadt's motorette. The knuckle, which had been broken off at New Britain and had been repaired there, the day before, broke off again and the plucky contestant abandoned the contest. Although we covered 96.6 miles, as against 79 and 68.6 miles of the previous days, there seems to have been remarkably few tire punctures on the 11th inst. To date but six machines were obliged to discontinue in the contest. A number of these would still be in line had their operators not overlooked taking along a few small parts, such as poppet valves, for instance. Some breaks of a serious nature can ofttimes be remedied, but a little ingenuity must be displayed by the motorist. The dust along the roads amounted to nothing on Saturday, and, judging by the showing made, it has not interfered with the operation of the autos. More of the vehicles are equipped with aprons, below, to keep off the dust. They are used under the Haynes-Apperson, De Dion (tonneau), Apperson Brothers' and numerous other rigs. Some of the Oldsmobiles have leather covers over their chains. S. T. Davis, Jr.'s big locomobile steamer is inclosed with sheet metal below, and the engine is encased also.

MINOR REPAIRS.

Very few of the chauffeurs availed themselves of the opportunity to make light

and adjustments Sunday morn-)ne of the connecting rods of one Elmore runabouts had to have its adjusted. The Franklin entry was vith a new tire, but no work was n its engine (a four cylinder air motor). The Apperson Brothers' a, No. 23, was in need of a new rim in the friction pulley that the circulating pump. The failure pulley to drive the pump caused the to overheat on Saturday and ac- for the delays on the road. The (F. I. A. T.) car will return to 'ork with but two forward speeds, rs of the intermediate speed having tripped. It is encouraging to ob- hat very little or nothing is being the clutches, variable speed gears running gears of vehicles on the r at the controls. Many parts are ed carefully by a number of the rs to prevent troubles on the road. things, only trifling matters, have ferent contestants the cup. A ter- n the spark plug of a Packard fell d caused a short delay. In the e of the writer the plug in the mo- No. 15 was cleaned carefully be- ving Springfield and tested. Three away from the start the motor l, or "shut down," in auto parlance. g was found to be sooty and a new s inserted. It took one minute rty-five seconds to do this and was y penalized stop made by the car tion.

great bulk of the motorists have along at a good pace during the riod of each run and have resorted ng to escape being disqualified. If licy is pursued on the homeward re will be very few machines in er but the 14 miles an hour class. the absence of arrows in the vicin- Worcester a few carriages left the course and made a circuitous trip found the highway that had been out. The route in some of the as not marked by arrows, the A. having failed to secure permis- put them up. The arrows used are ch better than last year's arrows They have too short a tail and are white, so that they cannot at once nguished from sign boards that uently nailed to the same tree or

FOURTH DAY.

of the operators must have ex- d a good deal of trouble finding y out of Boston, within the limits there were no arrows, and in the of which city there were but few, mate the official route. That the of the machines would reach the ntrol at Worcester on time was xpected, after they had demon- their ability to do so frequently The run to the city named was uneventful, if not more so, as all rs that had preceded it. The big Brazier tonneau stripped a fibre gear in the change gear box and had to be towed in by a team. Fortunately a steel gear was found at Worcester that was soon put into place, and the car left the noon control at about 3 o'clock.

There were two steep grades that had to be surmounted in the afternoon. The steeper one of these was within a few miles from Worcester. Pushing was resorted to on that hill by a number of occupants of some carriages. Others went up all right after having discharged all the passengers. In the case of No. 15 it was found, soon after the ascent had begun, that the little machine would take up the observer just as well as not, which fact elicited cheers from the natives. During the morning's run, on entering Worcester, this vehicle slewed around on a muddy street and came to a standstill, when the operator accidentallly bumped against a thumb lever and cut off the supply of fuel. On a light grade in the afternoon he again stopped his motor while looking around to watch a fellow contestant who was overtaking and crowding him. The writer observed but one vehicle during the afternoon that was making a penalized stop. Within the city limits of Springfield one car was seen making what appeared to be a detour to avoid reaching the control ahead of time and to escape disqualification.

FIFTH DAY.

Today's run consisted of two stages—viz., Springfield to Hartford and from that city to New Haven. Soon after crossing the border into Connecticut clay mud roads were encountered. On the way out they were dry and dusty, but today they were wet and muddy. Very little is done for the highways in Connecticut. There were many water bars in the roads that made fast driving very unpleasant at times. One of the light steamers had its body scorched by the flames that enveloped the machine and threatened to consume its woodwork. The operator had the fire out, however, almost before his observer realized the gravity of the situation. A few minutes later the writer saw flames under the body of a steam carriage that was not contesting for a prize. The driver soon put it out and was on the road again shortly after.

During the afternoon's run nothing of moment had happened to any vehicle in the run by the time we reached Meriden, Conn. In the very heart of the town the jaw clutches between the motor and gear box broke, and we repaired to a machine shop near by. After extricating the friction clutch, which had become jammed, the crank shaft was found to be bent too much to be of further service. That was the finish line of the little vehicle that had made but three penalized stops of less than two minutes in aggregate, two of which were accidental and one of which was caused by a foul spark plug. The Ward Leonard entry (No. 15) no doubt would have covered the whole course at the rate of 14 miles an hour but for that accident. No repairs were made en route or at controls. Mr. Chase, the operator, is deserving of no little praise for the showing which his charge made.

HUGH D. MEIER.

B 51.

FIRST HALF.

The writer was assigned to a Stearns steam carriage, B 51, in the Reliability Run of the Automobile Club of America, from New York to Boston and return. It was the only one of that manufacture in the run, and has proved itself a thoroughly reliable carriage, so far, and the most comfortable automobile of any make or motive power that the writer has ever ridden in. "It runs like a Pullman." There has been no trouble with either steam or air pressure, boiler, feed or throttle control; the tires have not been touched since leaving New York, and with the exception of a split close nipple next the safety valve and two broken water glasses, there has been nothing needed by the running mechanism of the car. The lubrication has been all that could be desired and has had attention once a day only.

The car was operated by Mr. Sweet, the superintendent of the Stearns factory, and he has brought his charge this far with admirable judgment. The pace is, of course, slow when judged from a racing standpoint, but it is a little too fast to allow full enjoyment of the scenery along the route.

The writer has always been a strong advocate of steam for motive power in automobiles, and from observations on this first half of the run sees no cause for a change. While the percentage of steam vehicles in the run is small, it will be very interesting to see the final percentage of their reliability as compared with that of the gasoline cars, and for quietness and comfort the steamers seem still to have a great advantage. All those in the run have been able to make the schedule time with large reserve of speed.

THE METHOD OF MAINTAINING GASOLINE PRESSURE

on the Stearns carriage was new to the writer, and seemed very reliable and wasted neither gasoline nor water, as a steam operated compressor does. The carriage is fitted with two steel gasoline tanks, holding 7½ gallons each, and through each tank runs a small pipe connected with the boiler and controlled by a valve from the seat. After steam is once raised a very slight opening of this valve will admit live steam to the pipes through the gasoline, and the heat from the steam contained in these pipes expands the gasoline in the tanks and raises the pressure from 20 pounds per square inch to 70 and 80 pounds per square inch in from ten to fifteen seconds, and holds it there for hours at a stretch. In this way a hand pump is

H. A. KNOX, ONE OF THE FIRST ARRIVALS.

only used to give the initial pressure when first getting steam. When running on good roads or level stretches where high pressure on the fuel tanks is not needed, a turn of this valve closes it and the pressure immediately drops.

The boiler is equipped with the usual automatic fuel regulator, and the gasoline expansion is controlled by a regulator which prevents any excessive pressure in these tanks. So far we have used no higher pressure than 80 pounds—the tanks are tested to 300 pounds.

One very noticeable feature of the entire run was the apparent familiarity of the horses everywhere with all makes of automobiles. The writer saw but one horse scared on the entire trip, and he was not badly frightened.

SECOND DAY.

The second day of the contest began this morning and our car left the control at New Haven at 9:9:15, official time. Just on the outskirts of New Haven the Locomobile gasoline machine, C 29, was passed, stalled and making some sort of repairs. No more stalled machines were seen until Wallingford was left about a mile behind, when a De Dion motorette (A 54) was sighted in trouble. Apparently the front axle was broken, but it was learned later that one of the steering arms on one of the steering knuckles had broken and dumped the machine on the side of the road.

Nothing further of interest occurred until just after passing Meriden, where a Grout car was seen suffering from burner troubles. The wind being rather stiff affected a number of steam machines, but the Grout carriage was the only one seen stopped from this cause.

Meriden was a water station, but we did not stop for any, as we expected to reach Hartford before needing any, which proved to be the case.

Between New Britain and Berlin station a Winton touring car was seen making repairs, the nature of which could not be seen at a glance.

Hartford was reached at 12:03, official time, and lunch was had at the Allyn House. At this point we took on water and 2½ gallons of gasoline. No stops of any description had been made, and at noon the only thing done to the machine was to oil the engine parts.

Our car left Hartford at 1:41, official time, and we had great difficulty in getting through the crowd in the city without coming to a stop, but this was accomplished finally and the city left behind.

About midway between Hartford and Wallingford a Toledo car was seen making repairs of some sort. Just before reaching Windsor another Grout car was seen in trouble.

Two miles beyond Windsor another steam car was seen stalled.

Beyond Windsor Locks the roads were in wretched shape, being full of short holes and in some places deep ruts.

Springfield was reached at 3:22:15, official time, and we took on 5 gallons of gasoline and filled the water tank.

No stops had been made during this (Friday's) run of any description, either penalized or not, and no repairs or adjustments were made at either noon or night control, with the exception of lubricating the engine parts, and we had been on schedule time at each control.

THIRD DAY.

The start from Springfield Saturday morning was made by our car at 9:07:45, official time, and Five Mile Pond and North Wilbraham were passed without anything of interest occurring.

About midway between North Wilbraham and Palmer the De Dion motorette, A 54, which had been repaired, was again seen broken down, and it was afterward learned that the repaired steering arm had broken.

After reaching Palmer the roads were in worse shape than any we had so far struck, and numerous short, steep hills were encountered.

After passing Warren, where water was taken on, the roads became even worse, and at West Brookfield a detour from the main road had to be made on account of repairs in process. This made the ascent of a long and very steep hill necessary, and to make conditions worse the road was full of loose stones and loose sand and gravel. Six machines, all gasoline touring cars, were seen stalled along the hill, the first being an Apperson touring car. The others either had the signs removed or were non-contestants. One large Panhard car was stalled in the middle of the road and we had to go partly into the ditch at the left side of the road to pass it.

After passing this hill and passing East Brookfield we had better road conditions, although a short 15 per cent. grade was found at Spencer and another 15 per cent. grade was encountered at Leicester.

Worcester, the noon control, was reached at 12:47:15, official time. We left Worcester at 2:24:15, official time, and from here on the roads were good macadam.

Between Shrewsbury and Northboro the locomobile B 35 was seen slowly ascending a short hill, with the operator walking alongside and trying to light the burner, which had been blown out. Everything went smoothly to Natick, where we took on water.

Near Wellesley an Apperson touring car —C 23—was seen making repairs, apparently a punctured tire.

The Boston control was reached at 5:37, official time, and we took on 5 gallons of gasoline and filled the water tank.

This completed the first half of the trip, and we had come through without making a single stop outside of controls, either penalized or non-penalized, and our car had arrived on schedule time to the minute at each control. No repairs or adjustments had been made outside of lubrication, and consequently no points had been lost.

Stearns' steam carriage, B 51, was the first carriage in the run to reach Boston, but two other vehicles, B 15 and B 39, both gasoline, caught up with it at the control and all three were given the same time of arrival.

The return trip began on Monday morning and ended Wednesday at 4:15 p. m. No work was done on the machine on the return trip, except at New Haven, where we packed one end of the glass of the sight feed lubricator and put an additional clip on the long hickory side bar reach as a precautionary measure. The carriage was even more comfortable on the return trip than on the outward trip. The roads were better and the weather perfect.

All through Connecticut the schools were given recess while the tourists were passing, and the scholars and teachers lined the streets, waving flags and cheering heartily.

Some mention was made of an expected show of hostility on the part of the farmers, but the writer saw no evidence whatever of this, but much to the contrary.

Too much cannot be said of the management of the run by the officials of the club, from the chairman of the contest committee to the junior member of the official timers' party, and every possible consideration was shown that was consistent with the due performance of their duties. The chef des garages had a difficult post to fill, but he was equal to the occasion in every instance and deserves the thanks of all.

To Mr. Butler, the secretary of the club, must be given full praise for the painstaking manner in which he looked after the multitudinous details of his various duties, and everyone appreciated his work. While perhaps the hotels and restaurants in some of the smaller towns did not quite rise to the occasion, it was in no wise the fault of the club or its representatives, and it must be borne in mind that the occasion was a very unusual one.

W. K. Wright.

Scene at the Finish.

B 6.

FIRST HALF.

Arriving at the starting point on Thursday morning and reporting to the operator of the car to which I had been assigned as official observer, I was pleased to see that it gave every indication of being an easy riding machine.

It was B 6, entered and manufactured by the Foster Automobile Manufacturing Company, of Rochester, N. Y. The carriage is of the runabout type, with a box in front which can be converted into a seat for two persons facing forward. This box provides a place for the gasoline tank, holding about 12 gallons, tools, etc. It has flexible platform springs, both front and rear, and without reaches. The engine is of the ordinary two cylinder type, 2½x3½ inches, with plain main bearings and conical crank bearings on the connecting rods. The cranks are inclosed in light cases, having shutters to open for inspection and greasing.

A liberal sized roller chain is used to transmit power to the rear axle. There is a hand water pump in addition to the one driven from the crosshead, but no steam air pump. To start with, a hand pump is used, but afterwards pressure in the air tank is maintained at about 80 pounds or more by an ingenious interlocking arrangement by which the cylinders are made to act as an air pump and brake on descending a grade. The throttle being closed, a valve in a pipe connecting the steam chest of the engine with the air tank is opened and the engine reversed. As soon as sufficient pressure is shown by the air gauge the valve is closed. As a brake this arrangement is very effective and it is seldom necessary to use the foot brake.

The car is equipped with a 14 inch boiler and burner, which seem fully competent to propel it, weighing as it does 1,200 to 1,300 pounds, up all ordinary grades encountered without loss of pressure and at a good speed. Going up the long and steep grade on which a number of gasoline cars got stalled Saturday morning there was a loss of about 50 pounds pressure, but it was taken at a fair speed.

So far we have had only one penalized stop of one and one-half minutes on account of a union working loose and allowing steam to escape. Unfortunately just about a half mile from the Boston control the gasoline ran out, compelling us to push in, just coming in on time.

The run, taken altogether as a test of endurance, is a very fair one. While some of the roads encountered are of the best, others are as bad as anyone is likely to run over in touring, and in ordinary touring no such speed as the cars maintained steadily on this run is likely to be attempted over the rougher roads. With rainy weather and muddy roads to contend with the records made would probably have been different, but the indications are that the roads will be in good condition on the return trip.

THE RETURN.

The return trip from Boston was made in good time, until we reached Hartford. After getting lunch and preparing to start, when the driver opened the throttle to move forward one of the cranks of the engine was broken off. This ended the run for us. The record for repairs is as follows: Boston.—In giving the carriage a thorough examination the operator thought best to replace a slightly worn pump arm. Although a steel drop forging, it seemed very soft. On Monday morning, on opening the throttle, it was discovered that the pipe or nipple leading into the steam chest was cracked and had to be replaced, which was done quickly. At Chestnut Hill the operator had to clean out the vaporizer nipple, which had clogged somewhat.

Tuesday morning, at Worcester, it was found that gasoline was leaking from the vaporizer, and after taking it off and replacing the leak was found to be from a plug in a hole put in the latter for cleaning out. The carriage was out of stock and had not been run many miles before starting in the contest. The framework, springs axles, chain, etc., promise good wear and the riding qualities are excellent. The engine, though of a reputable maker, seems to have some points that can be improved. The boiler, although only 14 inches, gave ample power. Having had no experience whatever on steam wagons, I do not know what comparisons to make on the internal mechanism, but the running properties were excellent and the running parts liberally proportioned.

H. W. Struss.

Haynes-Apperson No. 10.

FIRST DAY.

This car was the touring surrey manufactured by the above firm, and weighed in at 2,125 pounds, thus coming in Class C. It carried Elwood Haynes (the driver) and the writer (as observer) on the front seat and two passengers on the rear seat. The horizontal engine (double cylinder, of the opposed, balanced type) and mechanism of the car are too well known to need description here, so that the operation of the motor and general behavior of the vehicle under the various conditions met with are the subjects that will receive consideration.

Our start was made at 9:24:30 and the ensuing run to Norwalk, the first control, was finished in schedule time, at 12:33, an elapsed time of 3:08:30, or, deducting five

minutes consumed in a non-penalized stop under Clause 12 of Section D in Rule 12, the actual running time was 3:3:30.

The run was entirely uneventful, the car performing the comparatively easy task set with the greatest facility. One feature that early impressed itself upon this observer was the remarkable quietude of the engines, which, with a well nigh perfect body suspension, provide a comfortable riding quality that cannot be too highly commended. During the day's run, and particularly on some of the Connecticut roads, a few extremely rough spots were met with, and these, although causing some jolting, were unable to vary to any degree the easy movement of the car.

The steering proved to have a ready response, the connections being near the centre of the hubs, whereby very slight movement of the tiller was necessary in making all ordinary turns.. The tiller on this car was rather longer than needful, so that the driver's elbow projected more than was desirable; but this minor fault could at once be remedied by shortening the rod, or giving it a different curvature.

We used the middle gear the larger part of the run, averaging 12 or 14 miles an hour; occasionally, after reducing speed to the 8 mile limit in towns, throwing in the high speed to make up time. Changing the gears was accomplished almost silently, and without perceptible jar.

The low gear, which was used on one 11 per cent. grade, worked rather stiffly, resulting in some noise, due no doubt to the fact that it has had little employment. The high gear worked "sweetly," as the French say.

We were forced to make one other stop of about five seconds' duration, due to the thoughtlessness of the operator (a non-contestant) of a red tonneau car, who had left said car in the middle of a narrow road on a steep up grade. Two ladies were in the car, which blocked the way until we were able to back and work around some rocks. If this meets the eye of the operator in question it is hoped he may remember in future to have more thought for other users of the road.

En route we passed the following cars stopped for tire or other repairs: B 14, A 54, B 65, B 44, C 50, C 43, C 67, C 34.

At Norwalk we replenished our gasoline tank with 5 gallons. Start from Norwalk was made at 1:59:15, reaching the New Haven control at 4:27. No incidents occurred worth mentioning, beyond perfect traveling and the necessity of doing the last few miles at low speed, to avoid excess of speed average permitted. The cars passed on the road were B 73, which failed to quite make the top of a hill, presumably through loss of steam pressure; B 14, and A 19.

Fuel replacement at New Haven was 4 gallons and water 3 gallons.

SECOND DAY.

Friday morning before the start the machine was critically examined by the operator and his mechanic. The points of the sparker, which is of the make and break variety, were cleaned and about a pint of lubricating oil was added to refill the reservoir. The gasoline tank test cock was found to leak and was closed with a screw stopper contained in the equipment (a useful detail). A screw grease cup for lubricating the engine shaft bearing had come off, but was found in the rubber dust check apron and replaced.

The clutch for the low gear had worked somewhat loosely and was tightened up. The car was then pronounced "ready," and we got the order to start at 9:6:30. The running and operation were all that could be desired, with the slight exception that on the steeper grades met with the high gear clutch slipped somewhat—probably because of contraction from the low temperature (there had been frost in the night), wherefore in ascending grades the middle speed was used. Later in the day the high speed operated to perfection without tightening, wherever used.

At 11:35 the car was stopped because of a flat rear tire. This tire being of the clincher type, the cover was pried off and a new tube inserted. The time occupied in making the repair was 41m. 30s.

Arrival at Hartford, 12:44, elapsed time 3:37:30; or, deducting the time of tire stoppage, actual running time was 2:56.

At Hartford we took on 4 gallons of gasoline and 3 gallons of water.

We passed the following cars stopped on the road: C 29, B 61, B 16, B 32, B 77. The latter had dropped its driving chain.

Our afternoon start was made at 2:0:45. The roads to Springfield were extremely bad in parts; and because the route had been changed to avoid some State road repairs we were in doubt as to the direction. This was particuiarly the case on the Springfield road, near Suffield, where River road crosses, and the operator, in his doubt, did not notice a deep gulch at this point, which, in consequence, we charged on the high speed, resulting in a good shaking up of both car and passengers; also parting the chain. The work of replacing the chain occupied thirteen and three-quarter minutes. Finally, in crossing South End bridge into Springfield, we were blocked by a freight train one and one-half minutes. Control was reached at 3:54:45. Elapsed time, 1:54. Deducting fifteen and one-quarter minutes for two stops, actual running time was 1:38:45. The change of route caused a miscalculation of distance, with the result that we were a few minutes ahead of our schedule.

Notwithstanding the severe shaking received in crossing the gulch and the following very bad road, the machine ran just as smoothly as before.

Stopped on the road were B 77 and A 19.

The fuel supply received 3 gallons and water 2 gallons.

THIRD DAY.

Saturday morning our start was made at 9:02, the run to Worcester ending at 12:38:15. On the 12 per cent. grade between West and East Brookfield, before changing from the second to the low gear, the rear cylinder ceased work on account of the igniter pin becoming hot. Lubrication was applied, the low gear thrown in, and the car at once proceeded. But an actual stop of fifteen seconds' duration had to be recorded against the car. The same cylinder missed explosions several times subsequently when the engine was running at low speed, which led to the conclusion either that a more positive means of oiling the ignition pin was desirable or that the retractive spring required greater tension. It was noticed that when the car was on the low gear with the engine running at high speed our speed in hill climbing was in excess of other cars having greater horse power, while all moderate grades were surmounted easily on the middle gear.

Coming into Palmer we passed B 54 with its front wheels collapsed. B 40 had also stopped on the road.

At Worcester we took on 5 gallons of gasoline, leaving space for probably another gallon, the run of 52 miles having been exceedingly hilly and for a large part through abominable roads.

Departure from Worcester was timed at 2:17 and arrival in Boston 5:25:30. The roads were excellent, although hilly, and because when nearing the control it was impossible to obtain data as to the remaining distance, which we believed shorter than proved to be the case, we "loafed" 2 or 3 miles, sometimes at as low a speed as 2 miles an hour, but finally had to spurt ahead over the slippery streets (rain had just commenced) in order to be within the limit.

The main feature of the machine that struck this observer on this run was its ability to "crawl," with perfect engine performance, this function being of inestimable value in operating through city streets.

THE SECOND HALF.

The machine was not even looked at on Sunday. Monday morning, prior to the start, all parts were carefully examined; the small coiled spring for one of the igniter pins, which had seemed to have insufficient tension, was tightened up, and both spark plugs were cleaned. A new wire link uniting the ends of the magneto pulley was inserted. The oil reservoir (dimensions 7x7x3½) being two-thirds empty, was refilled, and the several grease cups were also replenished.

Our start was at 8:3:15 and we reached the Worcester control, 44.6 miles distant, at 11:8.

The roads were quite heavy, owing to the rainy weather that had prevailed since Saturday afternoon; but their bad condition and the several 10 per cent. grades met with had no effect on the going, our

motor moving the heavy load (about 3,000 pounds, with the four passengers and their baggage) through the worst places with ample reserve power.

C 43 was seen to have stopped on this run.

At Worcester we took on 5 gallons of gasoline and 2 gallons of water. The clutches and grease cups were tightened up, in preparation for the coming severe test in the run to Springfield. Our time of leaving Worcester was 12:45, and the journey to Springfield, 52 miles, was finished at 4:19:45. One 15 per cent. grade and several of 10 per cent. and 12 per cent. were encountered. In parts the roads were very poor. The schedule time was easily performed.

C 34 was passed stopped for a flat tire. At the control we added 5 gallons gasoline and 3 gallons water.

Tuesday morning we started for Hartford at 9:3:15, arriving at 10:46:45. The short journey of 26.4 miles proved a severe test on account of the execrable condition of the roads, but no inconvenience was suffered beyond some jolting. At the control we added 3 gallons gasoline and 1 quart lubricating oil.

Leaving Hartford at 1:3, we reached the New Haven night control at 3:57:30, the run being absolutely without incident, beyond an uncomfortably slow crawl in for the last few miles due to a miscalculation of the distance. Five gallons gasoline and 3 gallons water were taken on before putting the vehicle up for the night. Wednesday morning the start was at 9:4, reaching Norwalk at 11:24, where 5 gallons gasoline and some water were taken; again leaving at 1:2:45, and reaching the final New York control at 4:7:30.

Throughout the run we had not the slightest trouble in keeping the schedule set, and could easily have conformed to a much higher limit. Although the manufacturers do not claim great speed as a feature of their machines, it was noticed by this observer that they could hold their own with nearly every car in the run, while, in hill climbing, all gasoline cars of other makes met with were left behind.

But for the chain trouble, and for the fifteen seconds' stoppage caused by the igniter pin or its spring on the way out, car No. 10 would have had a clean sheet, which is not at all bad for the transportation of so heavy a load over 500 miles of indifferent roads. Just before the start, when the engines were all running free, it was easy to note, by comparison, the rare feature of absence of vibration in this car. It was as easily marked when with the engines connected the car was running alongside cars of other makes.

The writer was asked by Mr. Haynes whether he would advise adopting the tonneau style of car, to which reply was made: "Had the inquiry been made prior to the run the answer would have been 'yes'; but, after the thorough demonstration made of your surrey style, the equal comfort in

J. Frank Duryea, in His Gasoline Machine, First at New York.

both seats, the more ready accessibility to the rear seat than to a tonneau, and the all around success that you have achieved with this style of car, it would seem unwise to make such change."

The speed changing is so quietly effected as to be only noticeable in the result.

With such an excellent showing as was made during the week's run it is hard to find points to criticise or improvements to suggest. Although the tiller is used for steering, many of the firm's cars employ the wheel, either form being provided at option of user. F. W. Barker.

Knoxmobile, B 46.

FIRST DAY.

The first car of this well known make to start from New York was B 46, driven by F. N. Fowler, and having the writer as official observer. This machine was among the first to leave, and made a clean record for the day, arriving at the noon and night controls without any stops and on time to the minute. During the morning's run some half dozen cars were passed that were delayed on account of tires giving out. The Torbensen Gear Company's machine, passed as we entered New Rochelle, was the only one that appeared to be having other difficulties. The second Knox car, B 47, kept close behind us throughout the run, and both climbed all the hills with equal ease, not having to resort to the low gear more than three or four times throughout the morning's run, and ascending one of the big, long hills near Greenwich without changing gear at all. At Norwalk we were not bothered with getting water, as, having nothing but air to keep our cylinder cool, we did not boil away a lot of H_2O in running slowly to lose time before entering the noon control. All we needed to do, after getting dinner, was to fill our cylinder oil cup, which had been flowing too freely, and was two-thirds empty, and we were ready to help set the pace once more. This time we went more slowly, at what might be called an "auto jog trot," and by so doing managed to follow our schedule quite closely and enter New Haven without loafing, as at the Norwalk control. After filling up with 5 gallons of gasoline, which was about the consumption each day, we put the machine in the enclosure for the night, little dreaming of what was in store for us on the morrow.

SECOND DAY.

Friday morning opened fine and cool: but, although the weather was fine and the few adjustments we had to make (such as tightening the chain, filling the grease and oil cups, etc.) were soon completed, and we were off in a jiffy with the rest of the leaders, the day soon showed its unlucky star for us, and the Jonah town, New Haven, would not allow us to get beyond its borders. While ascending a slight grade out on State street the

CRANK SHAFT GAVE OUT.

and we were obliged to pull out on the side of the road and wave farewells as the other machines rushed by. (This is the third breakdown the writer has experi-

enced while passing through New Haven this summer.)

A PLUCKY REPAIR.

We telephoned the New Haven auto station for a tow, but as all its men were at work repairing a Fournier-Searchmont and a Gasmobile, Mr. Fowler was obliged to go in on a trolley car and borrow another Knox belonging to the proprietor of the station, in order to tow B 46 in. At 10:45 a. m. we began pulling our machine apart for repairs, and the ease with which the body was removed, after loosening four bolts, was one of the things that helped us greatly. With this out of the way the machinery was all disclosed, and it was a comparatively easy matter to find the trouble. This, although apparently serious, we did our best to remedy, with the result that after six hours of labor, aided by one helper from the station, we were sitting in the machine once more, ready to resume our journey. We finally got out of the city about 6:15, and made the run

TO HARTFORD BY MOONLIGHT

in the allotted three hours. Chilled through and hungry, we went into a café and warmed and hurriedly fed the inner man. We telephoned to Springfield that we were on our way, and learned that the banquet given by the Knox Company was in full swing. Then we set out once more on our cold, lonely journey of 26 miles in the dead of night. Soon after leaving Hartford we reached the place where the road was being repaired, and a detour was necessary around the fair grounds. We shortened this by cutting through them. and the empty stables looked desolate indeed, without even the ghost of a horse to give an unearthly whinny at the approach of his fast superseding rival. After leaving this deserted spot we struck onto the main road again and went about ½ mile in the car tracks on sand covered with coarse crushed stone. Finally we struck a fairly good road again, and after quite a ride reached Windsor Locks. It was then 11 o'clock and we had been on the road one hour since leaving Hartford. We warmed up a few minutes at a hotel we found open and then crossed the bridge and ran for an hour and a quarter more, when at last we pulled into Springfield.

THIRD DAY.

The next morning at 9 o'clock we were among the first to start, and we reached Worcester at noon and Boston at night without a single stop or mishap of any sort. The engine worked splendidly—almost as well as before the accident—and when we passed Apperson Brothers' red car at Wellesley, with the engine smoking, apparently from overheating, on account of lack of water, we thanked our lucky star that we had an air cooled motor. If a 5x7 single motor of this type works as perfectly as did ours, there is no reason why a double or triple cylinder engine of the same kind cannot be made to go, and with the perfection of such a one the water cooled gasoline motor will disappear, thus doing away with one more complication and reducing the causes for trouble. The Franklin four cylinder air cooled engine—the only other representative of this type—also made a good performance and seemed to run like clockwork.

THE RETURN.

Starting from the Boston control a couple of minutes after 8 on Monday morning, with but five machines ahead of us, we left the Hub at a lively pace, and after fifteen or twenty minutes' running caught up with Oldsmobile A 63, the first carriage to start that morning. We ran alongside for some minutes, and finding that the driver, Owen, was of the same mind as ourselves, in that he preferred a sure and steady gait to a speedy and machine racking one, we followed his lead and kept with him nearly the whole way to Worcester. The road was quite soft and muddy in the unmacadamized spots, but we were free for once from that bugbear of all motorists—dust. We could ride along close together and view the variegated coloring of the landscape through perfectly clear air. And how fresh and different everything seemed! This freedom from dust during the picturesque ride from Boston to Springfield, a direct result of the rainy day in Boston, is one of the things we all had to be thankful for.

We were directed to the proper route through Southborough by arrows and also by members of the Marlborough Automobile Club, who were on hand to direct us rightly. On the outward trip most of the autos took a roundabout course through Marlborough, since they missed the turn at Northborough that led to the shortest route. As this mistake was corrected on the homeward journey, the latter was shortened by several miles. At one place, on top of a short hill, a white arrow pointed sharply to the right up another incline. We and two other parties passed the crest of the hill and descended the other side without noticing the arrow in time to make the turn. There was a fork in the road just beyond, and, thinking we had better go back, we all turned around to ascend the hill again, when two farmers told us we were all right, and the straight road ahead was the better. We, therefore, turned around once more, bearing around to the right at a crossroad beyond (where one of the big cars, a Packard, attempted to charge a stone wall, the turn was so sudden); we finally crossed a bridge over the railroad just behind another machine which had made the turn at the arrow and covered the hypothenuse of the triangle instead of the two legs.

The rest of the trip to Worcester was uneventful. The control was reached shortly after 11, and the start for Springfield over the hilly portion of the journey was made at 12:45. As we were somewhat behind in starting, we left Worcester at a lively pace, catching up with our running mate, B 47, inside of the first hour. We forged ahead of this machine just before entering a long stretch of sandy road, where passing was impossible. Some fifteen minutes later we caught up with the Locomobile racer, which we followed for about 5 miles before we had a chance to pass. Soon after we did get by, a Stanley steam surrey occupied by a gentleman and two young ladies rushed by with the quietness of an electric and without any visible exhaust or smell of burnt gases. Charles Duryea, in his three wheeled "turkey," came along a few minutes after, and sailed along past the steamer, although the latter was going fast. About 8 miles from Springfield we caught up with the Knox car driven by Mr. Knox, and after "loafing" for nearly an hour, we both went into the control on time and within five minutes of each other.

The fifth day's journey from Springfield to New Haven was the shortest and easiest stage. Barring a considerable stretch of sandy road from Springfield to Suffield, the roads were in good condition. The detour around the Fair Grounds near Hartford was avoided by crossing some twenty-five yards of broken stone and ascending a short hill beside the road proper, as the latter was still torn up. Some of the machines had a hard time plowing through the soft turf and mud on this hill, but our air cooled motor took us through at good speed on the low gear.

The trip from Hartford to New York was uneventful, save for dust clogging the fine gauze in the suction pipe near Norwalk, thus causing us to lose power. A few raps on the pipe cleared this out. however, and we went over the big hills near Greenwich, many of them on the high gear. That the machine went the 400 miles traversed after the makeshift repair we executed at New Haven without a stop or hitch of any kind certainly speaks well for it. Then, too, when it is understood that it was an old car that had gone over 6,000 miles, having in this distance made 100 miles in the 1902 Long Island run in 4 hours 23 minutes, and having won blue ribbons in the New York-Westport run of May 30, and the Chicago Club's 100 mile test, the endurance and reliability of the machine are no longer in question. We learned afterward that the flywheel of the engine struck a rock in the road and sprung the shaft some time ago, and that the latter had been straightened at the factory. This, doubtlessly, accounts for the breakdown during the run. After this had been repaired the old machine acquitted itself as well in every respect as the other two, which were new ones. S. Y. BEACH.

B 8, Lane.

The carriage to which I was assigned as official observer was a Lane steamer, B 8. This is a substantially built surrey with 9 horse power engine. The boiler is of 19 inches diameter and a most efficient

steam generator, as I had ample opportunity to observe during the six days' run. My previous experience as an operator of a light steam vehicle made me somewhat skeptical as to a steamer making the trip without serious breakdown, but in this I was pleasantly disappointed. It is now my belief that substantially built steam carriages will hold their own with any other kind.

Up to Monday morning there were no stops of any kind en route. But in the afternoon the operator observed that the supply of water was growing smaller than the distance traveled seemed to warrant. While he stopped at a fountain and replenished the tank he discovered that a union in the feed pipe had worked loose and the water, instead of being delivered to the boiler or returned to the tank, was wasted in the open. Two minutes were sufficient to remedy this and everything proceeded well until about an hour later. In this stop, although it was made for taking water, the repair was made, and as rules are rules, it had to be reported.

An hqur later an intermittent escape of steam in passing over some very rough roads indicated some further trouble, and a hasty examination of the engine showed that the pin valve stem to the cylinder lubricator had jarred out. After a brief search the stem was found about 300 feet back on the road, and replaced in probably five seconds. Five minutes was charged to this stop. These were the only stops in the entire trip, and, I believe, reflect no discredit on the maker of the carriage. W. S. EATON.

On Knox, B 47.

FIRST DAY.

We all left New York in fine style, and on the beautiful roads in the vicinity of the metropolis little could be expected save perfect running. Our time of leaving was 9:11, and the first annoying incident was when B 44 refused to give us a reasonable amount of room when we desired to pass them on a hill. A little further on C 43 passed us on the wrong side of the road when there was an abundance of room on the right side.

NEGLIGENCE OF OBSERVERS.

The observers are in some cases altogether too negligent about these points. Their instructions are given them to follow, not to look at.

OTHER PEOPLE'S TROUBLES.

We next passed A 19 inspecting motor and a little later B 36 taking water at Larchmont. C 43 was next overhauled examining transmission gear. A little further we overtook C 34 stopped, then B 21 with tire trouble, and soon thereafter reached the Norwalk control, 12:16:30, and a much looked for and a more waited for dinner.

After dinner our operator spent about eight minutes oiling and greasing up, and we were off at 1:51:45, to reach New Haven at 4:16:15, making our daily run just about to the "auto club's legal limit" of 14 miles an hour.

During the afternoon we passed B 73 stopped on a hill examining burner, C 62 stopped further on, and A 41 passed us on the wrong side. A 19 shed a passenger on one of the steepest hills.

On arriving at New Haven the machine was driven into the grass covered garage and left for the night, no adjustments being made.

SECOND DAY.

Friday morning the oil cups were filled up and a little play taken up in the steering gear, this being our only adjustment. We started at 9:1:45 for Hartford, which city we reached without incident at 11:53. Here we had a really good dinner, and, after filling the gasoline tank and tightening the belt driving fan, we left at 1:31:30 for Springfield, reaching the latter city at 3:14:45 after a pleasant but uneventful run. The gasoline tank was again filled and the vehicle driven into the riding academy and left till the morning. While Mr. Knox went to attend to the banquet his company so kindly tendered us all, the observer busied himself in becoming acquainted with the enterprising city of Springfield

THIRD DAY.

Saturday morning saw us up bright and early, for this was to be our longest and hardest day's outward run, and all desired to eat well and get away as early as possible. The weather was cloudy and rain seemed probable. Mr. Knox spent about an hour and a half looking very carefully over the machine, but made no repairs, a few minor adjustments and a careful oiling up being all that was done. We departed at 9:0:45 and arrived at Worcester over execrable roads at 12:34:30. Being among the leaders in the run we saw but little of the trouble that was encountered on this stage. We did see, however, some fun on

FOSTER'S HILL,

near West Brookfield. This was a second Nelson Hill, but no hay motors were on this occasion used. Manual power was of much avail, however, in coaxing some of the machines to the top of the hill. It was not a particularly steep hill (about 12 to 14 per cent.), but the roadbed was bad and the deep ruts in the red clay were trying to the machines and particularly those having other than standard tread. The big, heavy vehicles were especially punished on this hill. The large vehicles, or rather the heavy ones, have again and again on this run proved their aversion for bad hills and poor roads. The light and medium weight vehicles are far ahead of the heavy ones over such courses as that between Springfield and Worcester. At this latter city the Automobile Club should have placed the control nearer the restaurant than it was.

We left Worcester at 2:15 and reached Boston in a drizzle at 5:20. The roads between these two cities being very good, the run was uneventful. Owing to going a roundabout way (by mistake) considerable time had to be made up, and for some miles most of us drove right up to the legal limit.

THE RETURN.

We spent Sunday in Boston, and as it proved it was a lucky thing we did, for this day was the only really disagreeable one on the whole run. It rained or drizzled all the time and was miserable weather to be out.

On Monday the sun came out fine, and we had a pleasant run from Boston to Worcester. The roads near Boston being of almost perfect macadam, were in far better condition than most of the contestants expected, considering the weather we had had. It is good it was so, for these splendid macadam roads lasted beyond Wellesley, and by that time the gravel and clay roads farther along were very well dried up.

From Boston to Worcester the run was easy, and few if any troubles were experienced by the several competitors. As my operator was a Springfield man and desired to get in first to his native town, we left Boston among the early starters, so as to obtain a good position at Worcester. We did so, and through the courtesy of some of the other contestants, who were even more lucky than ourselves, we managed to reach Springfield first. We, therefore, saw few of the road troubles that may have occurred. The road from Worcester to Springfield is certainly bad. It is simply a clay and red sand track, that soon becomes rutted.

In Springfield we were again finely entertained. This time by the Stevens-Duryea Company, who favored us all with seats at a local vaudeville show, where we not only enjoyed the pre-arranged entertainment, but also the ones furnished by some of our number who were fascinated with the footlights and those beyond them. We passed a very pleasant evening, and later attended the smoker also given by the Stevens-Duryea Company. Here we heard shop talk by the barrel. We turned in for the night well pleased with the run, with the prospects of the morrow and with a warm spot in our hearts for the city of Springfield, Mass., where we were on both visits so royally entertained.

From Springfield to New York the run has been practically a Sunday school picnic. The roads average well, and the hills are not very bad, the natural result being very few derangements except "tire troubles," which seem to bother considerably. Being in the front ranks we saw little trouble worth recording.

We arrived in New York slightly ahead of time, and, to our surprise, the first vehicle to reach the committee's car. Our operator, however, forfeited his position in return for a similar favor at Springfield.

As far as our own vehicle is concerned we arrived back in New York without the slightest bother or trouble on the whole

run. We had no stops and made no replacements on or during the run.

The following adjustments were made at controls, none being made on the road: The slow speed clutch was tightened; the connecting rod brasses adjusted; the exhaust valve ground in; the contact maker of the sparking device cleaned and the steering gear joints taken up. These were the only adjustments made on the whole run, I believe. The vehicle was oiled and inspected twice daily, at the morning and noon controls.

The machine ran perfectly, proved a fine hill climber and most easily controllable. The whole trip proved a very pleasant and agreeable affair, and we reached our destination with regret that there was not more of it. C. C. Bramwell.

The Run as Seen from B 16.

FIRST DAY.

On Thursday morning, the 9th inst., B 16 left New York shortly after 9:20, near the end of the line.

Near Fordham Duryea passed us in his three wheeler, decked out with yellow flags. From Fordham we ran steadily on toward New Rochelle. At Bartow we passed A 74, and just south of New Rochelle we passed B 14 stopped for some adjustment. Near Port Chester we passed Duryea pulled up at the side of the road making some repairs to his front wheel, which he had taken off of the carriage.

Near Greenwich B 65 was stopped, and the mechanic was underneath adjusting some part. Near Stamford C 34 was repairing a tire. While coming into Norwalk Duryea passed us at a lively speed. The run to Norwalk was made close to schedule time.

The run during the afternoon was uneventful. A number of cars were bunched together, and kept passing and repassing one another all the afternoon. Beyond Milford the White steamers came in sight, and from there on until the night control was reached the bunch of cars above referred to and the Whites were close together.

From Milford to beyond Savin Rock the road runs along the shore of the Sound, giving some beautiful views of the Sound and the shore near New Haven. One thing noticed repeatedly along the road was the way in which the steamers went up the hills, maintaining almost the same speed up hill as they did on the level; while the gasoline cars ran up slowly on the low gear. The roads for the greater part of the distance were in good condition, the worst encountered being near Milford. Approaching New Haven we passed a number of cars evidently loafing. B 16 made the run in good time. At many places, both in towns and in the country, men appeared along the road holding bridled horses, evidently for the purpose of accustoming them to the sight and sound of the cars. In most cases the horses took very little notice of the cars.

The people in all the towns through which we passed appeared to have taken a general holiday, and at places, particularly at turning points, lined the road on both sides, cheering and waving handkerchiefs.

At every school house along the road the scholars were lined up in an orderly manner, presenting a pleasing sight. At Bridgeport, particularly, the people were very enthusiastic.

The morning ride was somewhat tiresome, but during the afternoon the carriage maintained a steady gait, and the ride was a continuous delight.

We arrived at New Haven covered with dust but in good order.

SECOND DAY.

The start from New Haven was made shortly after 9 a. m. with a considerable number of cars ahead of us.

The run was uneventful until Wallingford was reached, where, upon arriving at the street crossing near the railroad station, a crowd of people were lined up along the street, leaving but a narrow passage in the centre. Just after we crossed the intersecting street a small white dog ran out in front of us and promptly disappeared beneath the car. He passed through, however, without injury.

Beyond Wallingford, on a sandy stretch of road, we saw B 12 in the ditch with both front wheels off, indicating a broken axle.

Between Berlin and New Britain we were delayed by the key in one of the inlet valves dropping out. A new one was improvised and we went on, arriving at Hartford near the end of the line.

The roads from New Haven to Hartford were for the most part in good condition. There were several stretches where the roads were very sandy and the dust blinding. For a short distance out of Hartford the road continued good; but after a while we struck the worst apology for a road the writer has ever traveled over. For the greater part of the way the road was merely a dirt track through the fields. At one place we met some farmers improving (?) the roads by the usual method of digging out the gutters and throwing the earth in the centre of the road. The result of this improvement (?) was that we traveled with one side of the car a foot higher than the other.

At one time during the afternoon, while going up a sandy hill, B 16 was signaled from behind to allow another car to pass. The driver pulled over to one side of the road and allowed the other car to pass, after which he returned to the centre of the road. This took place near the top of the hill. Just before reaching the top the driver of the preceding car attempted to change to the low speed, but his sliding gears failed to mesh, causing a sudden slackening of the speed, the result of which was that B 16, in order to avoid a collision, went into the ditch, where the rear wheel sank into the dirt about half way to the hub. The only way to get out was by backing down hill into the cent
road and then proceeding. The
trifling but annoying.

That afternoon we arrived at S
in good time.

THIRD DAY.

At Springfield everybody was
trying to get a front place on the

For a few miles out of town
were nearly free from dust; but f
on they were very rough and h
here and there a stretch of Stat
fine condition.

Approaching Palmer at the foo
hill, A 54 was in the ditch with
front axle. A short distance b
passed the occupants going for a
Approaching Brookfield was a v
hill, up which ran a rough dirt r

B 16 went half way up withou
when the car ahead became stall
worst place in the road. To av
ping B 16 was turned into the d
the occupants running alongsid
getting into the centre of the ro
the occupants jumped aboard
tinued up the hill.

At the next heavy grade we w
a good speed, but were slightly
after passing Palmer in order t
batteries.

The approach to Worcester re
funeral procession in point of sp
writer saw some cars whose wh
barely turning; while near the co
a steamer zigzagging across the
vancing about 6 feet at each turn.

After lunch at Worcester the r
again slightly after 2, B 16 bein
the first to start. For nearly t
distance from Worcester to Bo
road was excellent. The scenery v
tiful, but from the rate of speed
some of the vehicles traveled it
doubtful if the occupants saw any
the road ahead. Although B 1
among the first and maintaind a g
of speed it was being continually p
cars going at high speed, and u
proaching Boston these same cars
passed running as slowly as they
could without actually stopping.
the cars began loafing 10 mile
reaching Boston. About 1 mile
control the writer saw two light c
ing so slowly that it was only by
servation that the wheels were
move.

Along the road from Worceste
ton the arrows had been removed
report reached Boston that a n
cars had gone astray. B 16 fo
had no delay, and arrived in goo
the control with everything in ord

The police along the road were
commodating. Only twice w
warned by them in regard to ou
once in Bridgeport by a very offi
ficer, who told us to go slower
were already driving slowly be
car ahead and well within the le
The other time was in Boston, wh

us to drive with caution, as there a steep down grade.

MONDAY.

morning dawned bright and fair :ain of Sunday, and most of the ; were at the garage early. While was waiting to be admitted A 54 6:54, the occupants stating that driven all Saturday and Sunday his car, it will be remembered, ront axle near Palmer.

Northborough and Southbor- |1 was stopped, the occupants over the motor. At Northbor- was stopped. In the afternoon B 73 stopped near Palmer.

ore B 16 had no tire troubles; the day experienced enough to for the entire run. The first ccurred somewhere near Shrews- the occupants of B 16 had no of it until informed by the oc- a passing car. This puncture ed after considerable delay, and ceeded toward Worcester. Com- /orcester, not far from the con- it tire ran over some sharp sub- the inner tube exploded with a rt. This tire was repaired dur- on control. These delays caused e among the last cars to leave The run during the afternoon ough roads, but was uneventful. ed late at Springfield with the tire flat.

TUESDAY.

morning was bright, promising The contestants formed in line ly start. A short distance out- ringfield the writer passed B 35 rtly after passing the fire was ve burned itself out. This ve- d at Hartford immediately be- The effect of the fire was seen ched panels. The fire was evi- ied by the burner becoming ex- and the raw gasoline becoming n the burner was again started l.

ls during the morning were in s very good, but for the greater : distance the roads were com- ay and sand. After the rain of ese roads were very wet, and it was shown that the effect of wheels upon roads is to im- 1 rather than to destroy them. or more automobiles had passed were rolled down to a smooth

fternoon, outside of Hartford drawn up in a private roadway river making some adjustments rear axle. At Meriden B 15 d by some trouble with the North Haven A 71 was stopped of the road. Shortly beyond 'as seen taking on water, having hot engine.

s during the afternoon were, for art, in good condition, and the cars made a fine showing, arriving at the control in New Haven in quick succession.

WEDNESDAY.

Wednesday morning everybody was around early at the garage waiting for the doors to be opened. As soon as the door was opened there was a general scramble to be the first out of the garage and secure a front place on the line. B 16 secured a favorable position on the line, and after oiling up and inflating the tires a little was ready for the day's run.

The run was uneventful until Stratford was reached. There at the turn in the centre of the town a crowd was lined up on both sidewalks. Just after turning the corner, and while traveling at a good rate of speed, a dog, in size between a Newfoundland and a St. Bernard, ran out of the crowd immediately in front of the car and went under. The car did not stop, but rolled the dog over and over until he emerged from the rear, when he jumped up and ran at full speed down a side street.

We arrived at Norwalk without further incident. Shortly after leaving Norwalk we saw A 79 stopped, and the driver adjusting the engine. On a steep hill at Greenwich C 23 and A 41 were stopped, while just at the top of the hill B 36 also was stopped. Upon leaving Greenwich C 23 was seen at the side of the road. Coming into New Rochelle B 40 was stopped. Outside of New Rochelle C 1 was repairing a tire. All during the day B 16 was troubled with irregular ignition, due to inferior cylinder oil obtained at Springfield fouling the spark plugs. This caused difficulty in maintaining a uniform speed; however, we arrived at New York in good time, all of us very glad that the long ride was over, but not regretting the trip.

C. Z. NEWELL.

No. 24 B.—An Uneventful Run.

FIRST HALF.

The writer had the good fortune to be assigned to one of the White steamers, manufactured by the White Sewing Machine Company, of which Paul H. Deming was the operator. The writer of this article has had considerable experience with all the modern powers that are applied to locomotion over the highway and has been more or less of an advocate of the gasoline car for all long distance touring. After riding as far as Boston, however, and watching the operation of the different steam cars with interest I must say that I am again on the fence and fast leaning toward steam as the most reliable power when properly applied to a well built car, and in comparing notes with other observers I seem to be upheld in this regard.

Of the steam cars which left New York I have yet to hear of an accident to any of them which has in any way delayed their arrival, at each stopping place, on time. Of course, the speed has been slow, but they could all have gone much faster, and when one takes into account the flexibility and ease of control and the absolute freedom from noise and vibration it is evident that steam as a power for automobiles has possibilities and a field that will not be met by the internal combustion motor for a long while yet, if ever.

As for the writer's car, B 24, there is very little to say, except that, with all the other Whites, it came through to Boston without a stop, except at night and noon, and received absolutely no repairs or attention, with the exception of oiling the machinery once a day, previous to the morning's run. The longest day's run and the worst roads were encountered between Springfield and Boston. In this distance we used one-half a tank of water and 8 gallons of gasoline. We averaged 12 miles on 1 gallon of gasoline.

The Whites are, therefore, able to make a day's run without replenishing either water or gasoline. Our car requiring so little attention has given me opportunity to pay attention to the other makes and I have watched with much interest the performances of the latter and I have taken especial interest in the so called high powered gasoline cars.

It is a noticeable fact that in outward appearances the manufacturers have copied the French tonneau type almost exclusively, but I am sorry to see that in the majority of cases they still stick to the same arrangement of engines and parts as they have been using in older stanhope and surrey types of car; that is, they are still using the horizontal opposed type of engine with at least one cylinder under the body of the car in a most inaccessible position. In other words, the improvements are more apparent than real.

This latter feature does not, of course, affect the reliability of the car so far as a test of the present kind is concerned, but it is a very important factor in the life and repair bills of an automobile.

A machine that requires dumping all the passengers to replace a spark plug or from one to three hours to change inlet or exhaust valves will not meet with the permanent favor that has been awarded the best French types.

SECOND HALF.

Home again! What a welcome sound that would have been at the completion of a reliability test of even 100 miles three years ago! Now, however, we complete a 500 mile contest with as much matter of course as though it were simply a drive in the park. The dailies have kept the public pretty well posted as to the number of machines that have arrived at each control and the number of actual breakdowns, but they have had no opportunity to see the little annoyances and troubles that have been encountered on the road.

These latter the writer has looked into

(*Continued on page* 436.)

GENERAL TABLE OF ENTRIES.

Number.	Class.	Power.	Make.	Entered by	No. of Passengers Carried.	H. P.	Official Weight.	Tires.
1	C	Gasoline	Packard	Harlan W. Whipple	7	24	......	Goodrich.
2	C	Gasoline	Packard	Henry B. Joy	4	12	......	Diamond.
3	C	Gasoline	Packard	Adams-McMurtry Co.	4	12	......	Diamond.
4	C	Gasoline	Packard	Adams-McMurtry Co.	4	12	......	Diamond.
5	B	Steam	Prescott	Prescott Auto. Mfg. Co.	2	4½	......	Fisk.
6	B	Steam	Foster	Foster Auto. Mfg Co.	2	4	......	Diamond.
7	B	Steam	Lane	Lane Motor Vehicle Co.	2	9	......	Hartford.
8	B	Steam	Lane	Lane Motor Vehicle Co.	4	9	......	Hartford.
9	C	Gasoline	Pope-Robinson	Pope-Robinson Co.	4	24	......	Goodrich..
10	B	Gasoline	Haynes-Apperson	Haynes-Apperson Co.	4	9	......	Goodrich.
11	B	Gasoline	Haynes-Apperson	Haynes-Apperson Co.	2	9	......	Goodrich.
12	B	Gasoline	Haynes-Apperson	Haynes-Apperson Co.	2	6	......	Internationa
13	B	Gasoline	Autocar	Autocar Co.	2	10	......	G. & J.
14	B	Gasoline	Autocar	Autocar Co.	4	10	......	G. & J.
15	B	Gasoline	Knickerbocker	Ward Leonard Electric Co.	4	10	......	G. & J.
16	B	Gasoline	Knickerbocker	Ward Leonard Electric Co.	4	15	......	G. & J.
17	C	Gasoline	Apperson Brothers	Apperson Brothers	4	16	......	Goodrich.
18	C	Gasoline	Brazier	H. Bartol Brazier	4	15	......	Goodrich.
19	A	Gasoline	Torbensen	Torbensen Gear, Inc.	2	5	......	Dunlop.
20	A	Gasoline	Pierce	George N. Pierce Co.	2	4½	......	G. & J.
21	B	Gasoline	Darracq	Harold H Brown	4	12	......	Michelin.
22	A	Steam	Foster	Foster Auto. Mfg. Co.	2	8	......	Diamond.
23	C	Gasoline	Apperson Brothers	H. K. Browning	6	16	......	Goodrich.
24	B	Steam	White	Paul H. Deming	2	6	......	Goodrich.
25	B	Steam	White	Windsor T. White	2	6	......	Goodrich.
26	B	Steam	White	White Sewing Machine Co	2	6	......	Goodrich.
27	B	Steam	White	White Sewing Machine Co.	2	6	......	Goodrich.
28	B	Steam	White	White Sewing Machine Co.	2	6	......	Goodrich.
29	C	Gasoline	Locomobile	A. L. Riker	4	12	......	Goodrich.
30	B	Gasoline	Stevens-Duryea	J. Stevens Arms and Tool Co.	2	6	......	Dunlop.
31	B	Gasoline	Stevens-Duryea	J. Stevens Arms and Tool Co.	2	6	......	G. & J.
32	B	Gasoline	Rambler	Thomas B. Jeffery & Co.	2	6	......	G. & J.
33	B	Steam	Grout	Grout Brothers	2	6½	......	Diamond.
34	C	Steam	Locomobile	S. T. Davis, Jr.	2	10	......	Goodrich.
35	A	Steam	Locomobile	Locomobile Co.	2	4	......	Diamond.
36	A	Steam	Locomobile	Locomobile Co.	2	4	......	Diamond.
37	B	Gasoline.	Flmore	Elmore Mfg. Co.	2	5	......	Diamond.
38	B	Gasoline	Elmore	Elmore Mfg. Co.	2	5	......	Diamond.
39	B	Gasoline	De Dion	Kenneth A. Skinner	4	8	......	Michelin.
40	B	Gasoline	Autocar	H. B. Shattuck & Son	4	10	......	Dunlop
41	A	Gasoline	Olds	H. B. Shattuck & Son	2	4	......	Goodrich.
42	C	Gasoline	Searchmont	H. B. Shattuck & Son	4	8	......	Dunlop.
43	C	Gasoline	Packard	H. B. Shattuck & Son	7	12	......	Goodrich
44	B	Gasoline	Darracq	F. A. La Roche	4	16	......	Michelin.
45	B	Gasoline	Franklin	S. G. Averill	4	8	......	Goodyear.
46	B	Gasoline	Knox	Knox Automobile Co	4	8	......	Dunlop.
47	B	Gasoline	Knox	Knox Automobile Co.	2	8	......	Dunlop
48	B	Gasoline	Knox	Knox Automobile Co	2	8	......	Dunlop.
49	B	Gasoline	Fiat	C. H. Tangeman	2	12–16	......	Continental.
50	C	Electric	Neftel	Knight Neftel	4	*	......	Goodyear.
51	B	Steam	Stearns	Stearns Steam Carriage Co.	4	8	......	Fisk.
52	C	Gasoline	Winton	Percy Owen	4	15	......	Goodrich
53	C	Gasoline	E. V. C.	Electric Vehicle Co.	4	10	......	Dunlop
54	A	Gasoline	De Dion	Dr. Julius F. Hovestadt	3	6	......	Dunlop,
55	B	Gasoline	U. S. Long Distance	U. S. Long Distance Co.	2	7	......	Goodrich.
56	B	Gasoline	U. S. Long Distance	U. S. Long Distance Co.	2	7	......	Goodrich.
57	A	Gasoline	Pierce	Geo. N. Pierce Co.	2	5	......	G & J.
58	A	Gasoline	Rambler.	Henry C. Squires & Son	2	4	......	Diamond.
59	C	Gasoline	Winton.	C. E. Proctor	4	16	......	Goodrich
60	B	Steam	Grout	Grout Brothers	2	6½	......	Diamond.
61	B	Steam	Grout	Grout Brothers	2	6½	......	Diamond.
62	C	Gasoline	Toledo	International Motor Car Co	4	16	......	G. & J.
63	A	Gasoline	Oldsmobile	Oldsmobile Co.	2	4	......	Goodrich,
64	A	Gasoline	Oldsmobile	Oldsmobile Co.	2	4	......	Goodrich
65	B	Gasoline	Automotor	Automotor Co	4	12	......	Diamond
66	C	Gasoline	Panhard	Leonard D. Fisk	4	12	......	Michelin.
67	C	Gasoline	Searchmont	John Wanamaker	4	10	......	Dunlop.
68	B	Gasoline	Fredonia	Fredonia Mfg. Co	2	9	......	Goodrich,
69	B	Gasoline	Fredonia	Fredonia Mfg. Co	2	9	......	Goodrich.
70	B	Steam	Foster	Foster Auto. Mfg. Co.	2	4	......	Diamond.
71	A	Gasoline	De Dion	Kenneth A. Skinner	3	6	......	Michelin.
72	B	Gasoline	Geo. Richard	Manhattan Transit Co	4	10	......	Michelin.
73	B	Steam	Foster	Dr. M A. Carman	4	4	......	Diamond.
74	B	Gasoline	Thomas	Mechaley Brothers	2	6	......	Internationa
75	B	Gasoline	Rambler	Mechaley Brothers	2	4½	......	Diamond.
76	C	Gasoline	Searchmont	John Wanamaker	4	8	......	Dunlop.
77	B	Gasoline	Rambler	Columbus Auto. Exchange	2	4	......	Rambler.
78	B	Gasoline	Darracq	Col. W. P. Harlow	4	16	......	Michelin.
79	A	Gasoline	Oldsmobile	H. B. Shattuck & Son	2	4	......	Fisk.
80	B	Steam	Foster	Foster Auto. Mfg. Co.	2	4	......	Diamond.

* Has 8½ H. P. Kelecom motor and dynamo to recharge battery en route.

TABLE OF ARRIVALS AND DEPARTURES AT CONTROLS.

No.	Start from New York.	Norwalk. Arr.	Norwalk. Start.	New Haven. Arr.	New Haven. Start.	Hartford. Arr.	Hartford. Start.	Springfield. Arr.	Springfield. Start.	Worcester. Arr.	Worcester. Start.	Boston. Arr.	Boston. Start.	Worcester. Arr.	Worcester. Start.	Springfield. Arr.	Springfield. Start.	Hartford. Arr.	Hartford. Start.	New Haven. Arr.	New Haven. Start.	Norwalk. Arr.	Norwalk. Start.	Arriv'l at New York.
1	9.00	12.00	1.36	4.19.45	9.0.45	11.54	1.48.15	3.31.45	9.00	12.35.15	2.26.45	5.35	8.35.0	11.37.0	12.56.15	5.02.45	9.01.45	10.46.15	1.15.45	4.9.45	9.2.15	11.23.45	1.2.30	4.37.45
2	9.05	12.30.30	1.41.30	4.13.15	9.1.45	12.00	1.32	3.15	9.5.45	12.52.15	2.27	5.41	8.21.15	11.34.15	12.59.15	4.44.15	9.10.30	11.01.30	1.13.45	4.18	9.2.15	11.30	1.06	4.14
3	9.0.30	12.12.15	1.41	4.12.45	9.4.30	11.58	1.36.45	3.19.45	9.9	12.52.30	2.28.15	5.41.15	8.8.30	11.17.15	12.46.15	4.26.30	9.10.45	10.59.45	1.15.30	4.15.30	9.4.15	11.30.15	1.07.15	4.15
4	9.4.15	12.15	1.41	4.11	9.00	12.34.15	1.31.30	3.16.45	9.8.45	12.50.15	2.27.20	5.37	8.11.0	11.20.15	12.47.15	4.30.15	9.11.15	11. 1.45	1.15.30	4.25.45	9.2.45	12.21	1.16.30	4.22.45
5	9.17	12.31.15	1.54.15	4.16.45	9.9.15	12.3	1.41	3.22.15	9.7.45	12.49.15	2.24.15	5.37	8.5.45	11.18.15	12.50.15	4.37.30	9.4	10.57.45	1.0.7	4.9.15	9.3.45	11.31.30	1.11.45	4.25.15
6	9.8.30	12.25.30	1.51.15	4.20.45	9.2.45	12.11.45	1.38.45	3.23	9.5	12.54.45	2.13.15	5.46	8.9.15	11.30.30	12.53.30	4.41.30	9.4.45	11.00	....	....	....	....	....	....
7	9.6.15	12.10.15	1.53	4.19.45	9.3.30	11.56	1.42.30	3.25.15	9.13	12.51	2.22	5.38	8.12.0	11.20.45	12.52.0	4.33.30	9.5.30	10.54.30	1.15.15	4.14	9.7.15	11.33	1.11.15	4.24.45
8	9.8	12.21	1.41.15	4.19	9.7.30	12.6	1.39.45	3.31.30	9.14.45	1.1.30	2.22.30	5.41.15	8.19.0	11.30.15	12.52.30	4.55.15	9.7.30	10.58.30	1.11.15	4.14	9.8.30	11.37	1.11.30	4.25.15
9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
10	9.24.30	12.33	1.59.15	4.27	9.6.30	12.44	2.0.45	3.54.45	9.2	12.38.15	2.17	5.25.30	8.3.15	11.8	12.45.30	4.19.45	9.3.15	10.46.45	1.3.0	3.57.30	9.4	11.24	1.2.45	4.7.30
11	9.26	12.29	1.56.15	4.17.30	9.2.15	12.2	1.45	3.36.15	9.4.45	12.45.30	2.14	5.25.30	8.10.0	11.13.45	12.48.0	4.23.45	9.3.45	10.47.30	1.11.45	4.7.15	9.3.45	11.24.15	1.2.45	4.7.30
12	9.26	12.37	2.00	4.27.15	9.3	....	....	5.31	9.0.15	12.38	2.23	5.31.15	8.7.0	11.15.0	12.53.15	4.32.30	9.4.15	10.53.45	1.13.30	4.11.15	9.2.30	11.24.15	1.4.15	4.7.45
13	9.19	12.36.15	1.57	4.26	9.16.45	12.14	2.6.15	3.50	9.10	12.53.15	2.23.15	5.36.30	8.18.0	11.27.0	12.30.0	4.33	9.3	10.54	1.16.30	4.16	9.6	11.35	1.10.15	4.46.30
14	9.17.30	12.43.15	1.56.45	4.27.15	9.15	....	....	....	....	....	....	....	9.00	12.14.0	1.44.0	....	....	....	....	....	....	....	....	....
15	9.28	12.28.30	2.00	4.24	9.17.45	12.15	1.44.45	3.29	9.1.15	12.38.30	2.16	5.29.45	8.14.30	11.21.0	12.58.30	4.35.45	9.14.15	10.59.15	1.11.0	....	....	....	....	....
16	9.22.30	12.38	1.55.15	4.18	9.4.15	12.29	1.45.15	3.32.15	9.0.45	12.45.45	2.13.30	5.14.15	8.1.0	1.11.0	....	6.47	9.9.15	10.58	1.10.30	4.16.30	9.1	11.22	1.1	4.7
17	9.23.45	12.28	2.30	4.23.45	9.16.30	12.11.15	2.3	3.44.30	9.6.15	12.47.15	2.17.15	6.3	8.9.45	11.18.0	12.55.15	4.32	9.4.45	10.50.15	1.17.30	4.15.30	9.7	11.26.30	1.8.30	4.11
18	9.20	12.28.45	1.41.15	4.6.30	9.1	11.57.45	2.51.30	3.36.30	9.8	12.48	2.31.45	5.41.15	8.14.45	1.52.30	*1.50	6.45	9.11	10.58.45	1.14.45	4.16	9.5.45	11.33.15	1.9.45	4.12.30
19	9.19	12.16.45	1.46.30	4.25.30	9.7	12.55	2.0.15	4.03	9.10.30	1.47	2.33	....	8.9.0	2.10.0	....	....	9.10	11.0.15	1.12.0	5.23.30	9.9.15	11.38	1.10.45	7.13.30
20	9.12	12.15	1.53.15	4.18	9.2.15	11.57.30	1.31.15	3.13	9.1.45	12.35	2.16.45	5.23	8.12.45	11.19.0	12.47.0	4.26	9.1.15	10.45.30	1.2.0	3.55.30	9.6	11.38.15	1.5.45	4.7
21	9.00	12.31	1.37.30	4.23.45	9.19.30	12.12.15	1.53.15	3.36.30	9.16	1.13	2.32	5.38.30	8.39.0	11.41.15	12.56.0	4.41.45	9.4.45	10.50.30	1.8.30	4.4.30	9.4.45	11.24.45	1.4.30	4.6.30
22	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
23	9.23.45	12.30.15	2.1.30	4.25.15	9.15.30	12.12	1.34.15	3.37.15	9.3.45	1.46.15	2.23.30	6.58.30	8.9.30	11.15.30	12.51.45	4.32	9.5.20	10.51	1.16.45	4.15.15	9.6.30	11.27	1.10.30	4.17.15
24	9.11.30	12.19.15	1.47.30	4.17	9.10.30	12.8.15	1.41.45	3.28	9.7	1.49.30	2.18.45	5.29.15	8.19.15	11.29.15	12.57.0	4.59.15	9.5.45	10.56.30	1.9.30	4.9.45	9.4.45	11.28	1.3	4.7.15
25	9.18	12.20	1.48.30	4.17	9.12	12.8.45	1.42.15	3.28	9.6.30	12.47	2.21	5.31.30	8.20.45	11.30.0	12.57.30	4.34.45	9.6.30	10.56.45	1.10.15	4.10.45	9.5.15	11.28.15	1.3.15	4.8.30
26	9.13.30	12.15.45	1.50	4.17	9.12.15	12.8.30	1.42	3.26.45	9.6.45	12.46	2.18.30	5.30.15	8.19.45	11.29.30	12.57.45	4.35	9.6	10.55.30	1.9.15	4.9.45	9.6.15	11.28.30	1.3.30	4.8.30
27	9.13.45	12.21.15	1.50	4.17.15	9.9.45	12.8	1.41.30	3.26.30	9.8.15	12.54.30	2.18	5.30	8.20.38	11.29.45	12.58.0	4.35.30	9.6.30	10.58.15	1.10.0	4.11.30	9.6.15	11.29	1.4	4.10.45
28	9.14	12.22.45	1.50.30	4.17.15	9.8.15	12.7.15	1.35.30	3.26.30	9.7.15	12.50	2.18	5.31.30	8.20.0	12.12.0	1.10.0	6.0.15	9.6	10.51	1.9.45	4.9.45	9.5.45	11.28.45	1.3.45	4.10.30
29	9.1.15	12.7	1.50.30	4.9.45	9.00	12.17.30	1.49.30	3.30.30	9.0.30	12.39.30	2.19.15	5.33.15	8.7.45	11.19.15	12.51.30	4.38.15	9.1.15	10.49	....	8.11.0	9.9.15	11.29.15	1.7.30	4.10.45
30	9.26.30	12.43	1.39.30	4.25.30	9.9.30	12.11	1.37.45	3.20.15	9.2	12.44.15	2.19.30	5.31.45	8.2.15	11.4.45	12.41.15	4.17.15	9.1.30	10.45.45	1.2.0	3.56.30	9.1.30	11.19	1.0.30	4.2
31	9.18.30	12.32	1.59.45	4.25.45	9.7.45	11.59.15	1.39.30	3.42.30	9.15.30	1.2.15	2.26.15	5.41.45	8.2.45	11.16.15	12.48.15	4.45.30	9.4.30	10.55.15	1.11.30	4.18	9.0.30	11.10	1.00	4.2.15
32	9.22	12.22	1.52.15	4.14.45	9.10.15	12.3.45	1.34.45	3.18.15	9.2.30	12.33.30	2.14.30	5.24.45	8.6.0	11.17.15	12.51.15	4.31.15	9.3	10.48	1.8.45	4.5.30	9.1.15	11.27.30	1.8.15	4.11
33	9.0.15	12.34	1.54	4.19	9.2.30	12.7	1.47.30	3.35.30	9.7.30	12.59	2.23.45	5.41.30	8.4.15	11.20.30	12.48.45	4.41.30	9.2.15	10.54.15	1.5.30	4.5.43	9.7	11.37	1.12.15	4.24.30
34	9.1.45	1.25	2.51	5.20.30	9.19.15	12.21	1.51.45	3.38	9.6	1.02	2.30.45	5.43.30	8.38.30	11.48.0	12.45.0	4.15.30	9.3.30	10.48.15	1.4.30	5.33.30	9.9.30	2.6	....	6.15
35	9.1	12.10	1.47.30	4.15.45	9.00	11.55.15	1.34	3.18.30	9.3	12.45	2.20	5.30.45	8.15.38	11.25.0	12.50.0	4.51.30	9.8.45	10.57.45	1.4.0	4.3	9.2	11.23	1.1	4.15.15
36	9.10	12.27	2.2.45	4.47.30	9.12.30	1.9	2.17	4.31.15	9.12.45	1.0.15	2.29	5.38.15	8.13	11.42.0	1.03.30	6.00	9.9	10.55.45	....	4.9.30	9.6.45	11.29	1.10	4.51.15
37	9.10.30	12.13	1.48	4.11.30	9.3.30	12.12.45	2.56.30	3.41.45	9.14.45	12.54	2.30	5.36.45	8.2.30	11.05.0	12.45.30	4.23.45	9.2	10.48.30	1.4.15	3.58.30	9.1.45	11.22.30	1.1.30	4.2.30
38	9.10.10	12.12	1.46	4.8.45	9.19.45	12.17.15	1.50.30	3.32.30	9.14	12.50.30	2.32.45	5.38.15	8.3.30	11.16.0	12.43.15	4.38.30	9.4	10.51.15	1.6.15	4.2	9.3.15	11.23.45	1.1.45	4.2.15
39	9.2.15	12.4	1.40	4.4.30	9.0.15	11.57	1.32.45	3.13	9.1	12.34	....	5.14.15	8.1.15	11.6.0	12.41.30	4.18	9.1	10.45.15	1.45.0	3.55.15	9.2.30	11.21	1.0.45	4.2.15
40	9.16	12.20.30	1.48.15	4.10	9.6.30	11.58.30	1.42.45	3.26.45	9.4	12.42.15	2.25.30	5.39	....	11.14.30	12.44.15	4.38.30	9.6.15	10.53.15	1.10.15	4.7.30	9.5.30	11.27.15	1.7	6.57.15
41	9.3.45	1.49	1.49	4.26	9.19	12.13.30	1.40.30	3.27.30	9.1.45	12.48.45	2.17.45	5.23.15	8.0.45	11.10.15	12.41.45	4.22.16	9.0.45	10.45.15	1.1.30	3.55	9.3.15	11.25.15	1.1.15	4.18.30
42	9.22	12.28.15	1.44	4.8.15	9.16	12.22	1.50	3.33	9.11	12.51	2.12.15	5.29.30	8.18.15	11.30.15	12.54.15	4.37	9.5	10.57.30	1.0.30	3.59	9.4	11.30.15	1.5.30	4.14.45
43	9.15.45	1.9	2.4.30	4.26.15	9.5	11.58.15	1.33.30	3.11.45	9.2.45	12.39.15	2.13.15	5.21.45	8.6.45	11.26.0	12.50.45	4.31.30	9.2.15	10.47	1.3.30	3.59.45	9.3.30	1.57.30	....	5.52.30
44	9.10.45	....	....	....	9.18.15	....	....	4.29.45	9.4.15	....	....	....	8.8.45	11.18.0	12.43.45	4.17.45	9.1	10.44.30	1.45	3.55	9.00	11.12.15	1.00	4.2.15
45	9.19	12.29.15	1.45	4.14	9.14.15	12.15.15	1.45.45	3.32.15	9.14.30	12.55.30	2.31.30	5.43	8.7.15	11.19.30	12.55.0	4.38.30	9.8.15	10.59.30	1.6.30	4.9.15	9.6.45	11.30.45	1.8	4.18.15
46	9.8.30	12.18.30	1.43	4.11.45	9.1	....	....	....	9.3	12.44	2.15	5.20.15	8.1.30	11.2.0	12.46.30	4.20.30	9.3.15	10.46.15	1.3.15	3.56.15	9.3.30	11.23.30	1.2.30	4.6.30
47	9.11	12.16.30	1.50.45	4.16.15	9.1.45	11.53	1.31.30	3.14.45	9.0.45	12.34.30	2.15	5.20	8.1.45	11.03	12.41.0	4.15	9.0.15	10.43.30	1.00	3.50.45	9.1.30	11.18.45	1.0.30	4.2
48	9.11.30	12.19.45	1.46.45	4.15.15	9.2	12.4	1.39	3.39.45	9.1.15	12.45.15	2.14.45	5.25.15	8.3.45	11.14.30	12.43.30	4.27	9.2	10.54	1.5.45	4.7	9.3	11.31.15	1.9	4.19.30
49	9.4.45	12.12	1.46	4.9	9.0.45	11.54.30	1.31.45	3.15	9.1.30	12.36	4.25	6.57.15	8.2.0	11.3.30	12.41.15	4.15.30	9.0.15	10.43.45	1.0.15	3.51.45	9.0.30	11.18.30	1.0.45	*....
50	9.21.30	2.35.20	4.26	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
51	9.17.30	12.25.45	2.21.30	4.49.15	9.6.15	11.57.15	1.36.30	3.22	9.5.30	12.39.45	2.13	5.14.15	8.4.0	11.5.0	12.45.15	4.19.30	9.0.45	10.45	1.13.0	4.12	9.3	11.25.45	1.5	4.15.15
52	9.6.30	12.15.15	1.52.34	4.22	9.10.45	12.10	1.43	3.28.30	9.1.30	12.39	2.14	5.26.15	8.35.30	10.53.0	....	4.39.45	9.6.15	10.53	1.2.15	3.58.45	9.2	11.22.15	1.1.15	4.2.30
53	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
54	9.2.30	12.44	2.24.30	4.47.45	9.9	2.5	....	4.14.30	9.00	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
55	9.16.30	12.22.15	1.52	4.13.30	9.2.45	12.4.30	1.43.15	3.34.45	9.15.15	12.48.30	2.26	5.34.45	8.5.30	11.15.15	12.47.15	4.32.15	9.2.30	10.53.30	1.8.15	4.9	9.1	11.26	1.6.15	4.13.30
56	9.15.30	1.26	2.32	4.57.45	9.13	12.33	1.52.15	3.38.45	9.4.30	12.44.15	2.24	5.33.30	8.4.30	11.7.0	12.41.45	5.25.15	9.1.30	10.46	1.3.45	4.13.15	9.2.45	11.55	1.11	4.17.15
57	9.12.30	12.20.15	1.58	4.25.15	9.8	12.6.30	1.49	3.45.30	9.9.15	12.48.15	2.35	5.42.45	8.3.0	11.17.0	1.01.0	4.32.45	9.1.45	10.50	1.6.0	4.4	9.6.30	11.35.15	1.9.30	4.15.30
58	9.18	12.19.30	1.53	4.15.45	9.12.45	12.7.30	1.45.30	3.31.15	9.11.30	1.6	2.25.45	5.33.15	8.12.15	12.12.15	1.10.0	4.17.45	9.2.30	10.49.15	1.6.15	4.2.45	9.1.15	11.26.15	1.6.30	4.13.30
59	9.8	12.16	1.41.45	4.11	9.8.30	12.3.45	1.48.30	3.33.30	9.13.30	12.54.15	2.27.45	5.41.30	8.39.30	11.59.0	1.10.0	4.48.15	9.9.15	11.0.30	1.14.30	4.12.15	9.6.45	12.43	1.37	4.41
60	9.23	12.36	2.15	4.28	9.3	12.11.30	1.48.45	3.41.45	9.11.45	1.6.30	2.25.15	5.41.45	8.6.15	11.20.0	12.49.15	4.41	9.2.45	10.54.45	1.9.0	4.15	9.8	11.35.30	1.12.30	4.24.45
61	9.23.30	12.35	2.2.30	4.28.30	9.2	12.6.45	1.35.30	3.22.30	9.12.15	1.5	2.25	5.42	8.4.45	11.21.15	12.49.0	4.39.45	9.2.45	10.55	1.7.30	4.14	9.8	11.35.45	1.9.15	4.25
62	9.4	12.15.30	1.40.30	4.20	9.10	12.3.30	1.37.30	3.21.30	9.9.30	1.47.45	2.21.30	5.27.15	8.11.15	11.16.0	12.54.30	4.23.30	9.5.15	10.48.45	1.8.15	4.2	9.5	11.27	1.6.45	4.8.15
63	9.3.15	12.5	1.40.15	4.5.15	9.0.30	11.53.15	1.31	3.12	9.00	12.32.15	2.15.45	5.15.45	8.00.0	11.1.0	12.41.0	4.15	9.00	10.43	1.00	3.50.45	9.0.15	11.18	1.0.15	4.2
64	9.1.45	12.5.15	1.40.15	4.5.15	9.0.30	11.51.15	1.31	3.12	9.00	12.32	2.13.30	5.15.15	8.0.30	11.1.0	12.41.0	4.15	9.0.30	10.44	1.0.15	3.51	9.0.45	11.18	1.0.15	4.2
65	9.26.45	1.5	2.29.30	5.4	9.17.15	12.15.30	1.46.15	3.32.30	9.16	1.4	2.28.45	5.35	8.37.30	11.54.0	12.59.45	4.39.30	9.11.30	10.59	1.15.0	4.12.30	9.9	11.30	1.5.15	4.9.15
66	9.5.30	12.12.15	1.40	4.4.45	9.0.15	11.58	1.32.15	3.17.15	9.1	12.42	2.24.30	5.37.15	8.0.15	11.11.0	12.42.0	5.22.45	9.00	10.43	1.00	4.52.15	9.5.30	11.39	1.2	4.8
67	9.14.30	12.45	1.55.45	4.17.15	9.18	12.13.45	1.48	3.32.15	9.13.45	12.53	2.28	5.37	8.7.30	11.18.30	12.54.0	4.37.15	9.5	10.52	1.0.45	4.38	9.4.30	11.25	1.4.45	4.6.15
68	9.21	12.29.30	1.59.30	4.27.45	9.14.30	12.17	1.49.45	3.38.45	9.12	12.55	2.29.15	5.33	8.21.45	12.22.15	1.10.0	4.53.30	9.4.15	10.16.15	1.5.15	4.7.45	9.5	11.32	1.2	4.13.45
69	9.20.30	1.3	2.28.30	7.22	9.19.45	....	....	6.37.15	9.15.45	12.55.15	2.29.45	5.56	8.36.30	2.22.0	....	....	....	....	....	....	....	....	....	....
70	9.7.3	12.25.15	1.44.30	4.14.45	9.5.30	12.13	1.34.30	3.17.45	9.11.45	1.00	2.16.30	5.57.15	8.8.15	11.21.15	12.50.30	5.18.30	9.7.30	10.57.15	1.2.30	4.1	9.1.45	11.22.45	1.1.45	4.4
71	9.3	12.14.30	2.2	4.34	9.11.30	12.6.15	1.43.45	3.27.45	9.0.30	12.34.15	2.17.30	5.19	8.6.30	11.09.0	12.43.0	4.17.30	9.0.20	10.44.45	1.1.30	*....	9.0.15	12.00	1.15	4.22.15
72	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
73	9.0.15	12.11	1.40.45	4.19.15	9.3	2.1.30	....	5.01.30	9.15	....	4.30	11.10	8.44.45	1.26.0	....	6.57.30	9.8.30	11.17	1.17.30	4.31	9.7.15	11.59	1.12.45	4.52.30
74	9.25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
75	9.19.45	12.30	1.58	4.28.30	9.11.15	12.12.30	1.46.30	3.35.45	9.12.30	12.53.45	2.32.15	5.45	8.5.0	12.4.6	12.58.45	4.48.30	9.3.30	10.49.30	1.12.15	4.9.15	9.5.15	11.30.45	1.8.45	4.9
76	9.15	12.24	1.55	4.20	9.19.45	12.18	1.44.15	3.32	9.16	12.58	2.16	5.28.30	8.22.30	11.34.0	12.55.45	4.42	9.4.30	10.51.45	1.1.30	4.4.45	9.4.30	11.32	1.7.45	4.8.45
77	9.19.30	12.22.30	1.59.45	4.18.45	9.11	12.13.15	1.47	3.54.30	9.9.45	12.49	2.20.30	5.26	8.23.31	11.29.0	12.49.45	4.22.30	9.3.45	10.51.30	1.2.45	4.1.15	9.0.45	11.20	1.1.30	4.8.15
78	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
79	9.4.30	12.12.45	1.43	4.13.15	9.1.45	12.2.30	1.37	3.27.30	9.0.15	12.52	2.14.30	5.24.30	8.8.0	11.15.45	12.40.30	4.33.15	....	10.49.15	1.4.30	4.1.30	9.00	11.27.45	1.2.15	4.30
80	9.7	12.25	1.40.45	4.16.45	9.4	11.55	1.34.30	3.17	9.10.15	1.1	2.30.15	6.18.30	8.5.15	11.18.45	12.45.30	4.50	9.08	10.50	1.8.0	5.18.30	9.4.15	11.57	1.12	4.22.30

(*Continued from page* 433.)
with much interest and it is with these I shall occupy myself.

The only adjustments that were made were to tighten chains and on our carriage we adjusted the automatic fire regulator on the way home to enable us to carry more steam.

The reason for this great reliability of the White carriage is that the whole carriage is apparently built by men who have made a special study of the subject, and have then spent years in experiments, and profited by their early mistakes.

The machine is built strong and solid; there has been no attempt at saving weight at the expense of strength; all bolts and nuts are protected by cotter pins, &c.

The steam machines nearly all came through with little or no trouble, but the gasoline machines had their usual troubles, poor ignition, bad plugs, faulty vaporizers, broken pistons, crank shafts and gears, and last, but not least, broken carriage springs.

INSPECTION ADVOCATED AT FINISH.

It was really amusing to see the condition of some of the carriages at the finish, and here is a good place for the writer to make a suggestion for future runs. The condition of the machine should be taken into account in giving the final mark as well as the stops. For instance, a machine that comes home from a 500 mile trip at slow speed over almost perfect roads with broken springs, bent axles or crooked wheels is not a machine suitable for ordinary touring. What would the results have been had we had bad roads and pouring rain?

ACCESSIBILITY.

Another point that was brought out was that the foreign machine is not so much superior to the American built one when it comes to making a run like the one just completed, except in the matter of making repairs. The foreign machine is undoubtedly much more accessible than the majority of American machines, so that road repairs can be made in shorter time on the former.

It was a surprise to see how badly most of the large machines acted on the hills, while the smaller autos were able to go up with little or no difficulty.

It was noticed that many of the larger machines dropped their passengers on a steep grade, and the writer saw a large Panhard and a 24 horse power Packard being pushed up one of the hills, up which some of the lighter cars went on their intermediate gear.

Another feature that was brought out was the inadequacy of the modern pneumatic tire as applied to a heavy car.

Nearly all the heavy cars had tire troubles every few miles, especially those fitted with double tube tires.

And now, in conclusion, it will not be amiss to tell of the arrangements made for our accommodation at the different points along the route.

In this regard I do not think too much praise can be given the committee.

EARL P. MASON.

On A 79, Oldsmobile.

FIRST DAY.

This number represents an Oldsmobile, 920 pounds gross weight, equipped with tools, touring box and supplies. Tires were 28x3 inches, American Dunlop, which have given no trouble whatever.

Writer did not receive his assignment to car as observer until 9 p. m. the night before the start, and at that time could not find the operator, W. A. Frederick, of Boston. The next morning, however, we met at the appointed time and starting place.

The aforementioned touring box was a temporary affair about 12 inches deep and with cover hinged on and fitted to the rear of the body in place of the regular lid. This position necessitated its removal every time to get at the interior of the body.

An extra water tank had also been provided for the occasion, holding about 3½ gallons. The chain was encased in a leather boot, and the underbody had a protecting shield of enameled duck stretched across to protect the engine parts from dust.

Aside from these details and a different vaporizer (wherein lay the difference the operator could not or would not tell me) the car was claimed to be a regular stock machine.

At 9:4:30 we were given the word to go. It was a trifle slippery at this corner and I afterward heard that some of the large cars skidded somewhat.

Passing along the sandpapered park roads on the outskirts of New York city we were passed and repassed by several foreign high powered tonneau cars (not entered) at a speed which was over 14 miles per hour, to say the least.

At Stamford B 21 passed us, running with his tire flat, evidently trying to make the Norwalk control without stopping. Before it had left us very far in the rear, however, the tire came off and compelled a stop.

In this neighborhood also noted C 34 with flat tire.

The roads outside the city were very dry and dusty, and we were a dirty looking crowd when we reached the Norwalk control. When within one block of the control flags, a tire on C 1 blew up, but the car reached the control all right.

INADEQUATE HOTEL ACCOMMODATIONS.

The dinner arrangements were totally inadequate for the number to be fed, and the only way for one to get a bite toward the latter half of the one and one-half hours allowed for luncheon was to go out into the kitchen and help one's self.

Here our machine was oiled and fuel and water tanks filled, requiring about 2 gallons of gasoline and 1 gallon of water. Just on the outskirts of Norwalk and on turning sharply to the right to a sudden rise, and at the bott stopped B 73 and C 62, the latter a spark plug.

In the woods near Bridgeport C 2 stopped, but it began to mo shortly after passing.

Approaching Savin Rock and ven our route lay along the sh affording very pleasing views of t and harbor.

Arriving in New Haven, 2 g gasoline and 1 gallon of water into the tanks, and then all cars w over night.

SECOND DAY.

Next morning, starting at 9: had fine running until between ven and Wallingford we had to r first stop. This was only of thirty duration and was caused by the pet cock having worked open, stopped to close it, as it was no ble from the seat.

Noticed B 47 stopped a mome farther along. At Wallingford t children gave us a noisy welcome.

A little beyond B 12 ran into in trying to avoid a collision bent its front axle and broke t bolt which connects the reach front axle. Everybody who saw condition thought it was all up machine, but in about three hour was on the road again, having ef pairs at a blacksmith shop.

B 16 stopped on a hill just ou lin.

Reached Hartford on time a the Allyn House better prepare tourists. Left as soon as lunch p over. Found the roads near Wi ing repaired, and the cars in ma had to run over very rough sto gave the tires a very severe te miles north of Windsor we pas stopped to replace a spark plug.

Two miles north of Suffield some more new gravel and loo where road repairs were being m

Going into Springfield the roa dotted with automobiles, Knox vens-Duryea types predominatin

THIRD DAY.

At Springfield in the morning chine was oiled thoroughly, tire up, and 1 gallon of water and of gasoline used.

Noticed C 1 straightening be gear lever.

In leaving Springfield everybo a pace fully up to the limit. Abo out we passed two large cars n with tire troubles.

One mile from Palmer, on rough road through the woods, A 54, stopped with front whee flat on the ground. On the o Palmer we passed B 40, stopp count of gasoline pipe connecti and losing all the gasoline.

COOLING WATER GONE.

aching West Brookfield we no- r engine giving signs of overheat- on investigating we found the wa- ly had siphoned over, and to re- same we made a stop of twelve

l A 41 stopped at West Brookfield unt of broken wire.

eyond West Brookfield we came y steep hill, and soft and rutty as e worst hill on the course). We ie stalled, but learned afterward re several who had to push their s up this hill. Several non-con- ars were standing near to witness ggle up hill.

hill going into Brookfield we saw n giving a pretty exhibition of ibing by going up on the high

encer a White was stopped for This is the only instance to date noticed a White steamer stopped. a hill was encountered on enter- icer, with a sudden rise near the re C 23 was being helped up by rs.

n Leicester and Worcester a por- road was new and unsurfaced, it very choppy.

Worcester control we took on 2 of gasoline and 1½ gallons of

g out of Worcester our vapo- l not feed properly, causing the skip explosions quite badly, and up a hill it weakened enough to stop of thirty seconds for the en- ick up speed. From there on to our engine would occasionally he operator claimed it was owing or dirt in the gasoline.

n Worcester and Boston most of ws were missing, causing many ars to go around through Marl- stead of Southboro. Passing Marlboro we had to stop one n account of fire department ap- eing in the way.

e outskirts of Boston we were many local cars, which increased er of automobiles in the proces- 300, according to a local paper. 5 miles to the control were run zling rain.

f the Olds machines and B 56 o Boston with steering knuckles

J. G. Perrin.

. 5, Prescott Steamer.

FIRST DAY.

iter was assigned to vehicle No. scott steam carriage, entered by cott Automobile Manufacturing , Passaic, N. J., and operated by ells.

rt was made from the corner of hth street and Fifth avenue at n., official time. New Rochelle ed without incident.

Just after leaving New Rochelle No. A 54, a De Dion motorette, entered by the De Dion Motorette Company, Brooklyn, which had stopped from some cause not apparent to us, was passed.

When Mamaroneck was reached four minutes were spent in taking on water. No account of the amount of water was taken at this or any other point, so that it will not be possible to compute the evaporation.

About three-fourths of a mile before reaching Rye a small gasoline machine came to a stop just in front of us. The power seemed to have so diminished from some defect that the machine could not surmount the slight grade at this point with the hill climbing gear thrown in.

Shortly before reaching Greenwich C 43 was passed, evidently having tire troubles, and just after leaving Greenwich B 65 was passed, evidently having the same difficulty.

Several bad stretches of road were encountered, but on the whole the course was in much better shape than on the Decoration Day run.

At Stamford every inhabitant seemed to be lined up to see the machines pass.

At Darien Nos. C 34, C 43 and B 21 were passed, all apparently repairing tires. Norwalk was reached without further incident at 12:31:15 p. m., official time. This was 15 seconds behind the minimum time limit.

No stops of any description were made, except the one at Mamaroneck for water, and no repairs were made.

Lunch was had at the Norwalk Hotel, and the start was made from here at 1:54:15 p. m., official time, and nothing of interest occurred on the run into New Haven. No stalled vehicles were passed, although some had difficulty with dirty spark plugs, which caused misfiring.

At Norwalk three gallons of gasoline were taken on and the water tank was filled. At New Haven 3½ gallons of gasoline were taken on and the water tank filled. This made a total of 6½ gallons of gasoline consumed in 79 miles, or a consumption of 1 gallon to 12.1 miles.

J. Edward Baldwin.

At the Worcester Control.

Saturday morning opened cold and raw, with a chilly feeling in the air suggesting snow or hail. As the forenoon drew near, the time for the autos to reach Worcester from Springfield, the sun struggled through the clouds, but still the day was far from ideal and in contrast to the fine weather during the week. About 11:30 a. m. autos began to arrive, and among the first were the big touring car of the Pope-Robinson Company, driven by Harold L. Pope, and the 24 horse power Panhard of A. R. Shattuck. These, with a Mors and a high speed Panhard, lined up on the street opposite the store of Birney-Robinson's auto station, waiting for the contestants.

The first to arrive were the two Oldsmobiles, driven by Charles Page and a representative of the Olds Company. These had hardly stopped, when the autos came in thick and fast in almost a continuous line. All the riders were thickly covered with dust. Among the first arrivals was Elwood Haynes, hardly recognizable from the heavy coating of dust with which he was covered. As he stepped from the car and shook the dust from his clothing we shook hands and asked: "Any stop?" "Yes; fifteen seconds;" and this answer would in the main apply to most of the contestants, for there were but few laggards.

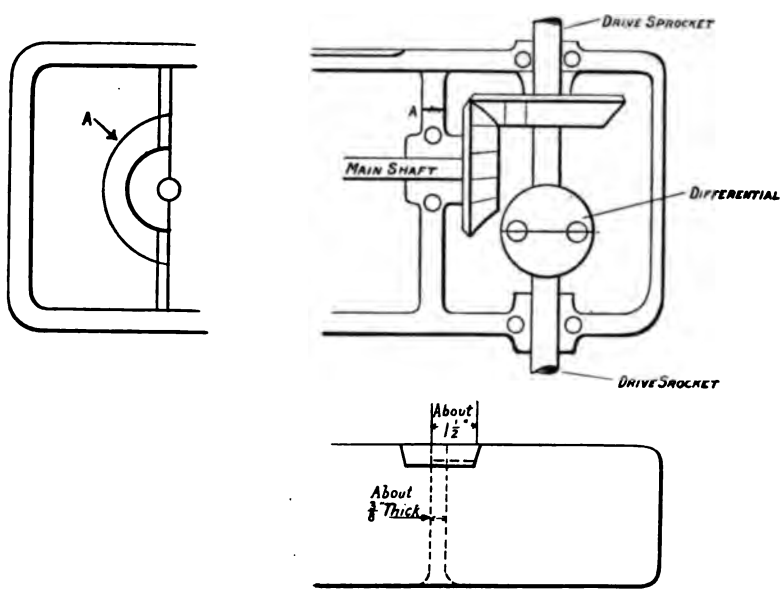
While the contestants were at lunch we took the time to hastily swallow a few mouthfuls and then took a station where we could watch the procession as it filed by, and it was a most interesting object lesson in design. The little Olds darting about with the dry goods box on back and small wire wheels; the little De Dion with Skinner's determined face and engine loudly sputtering and tearing itself all to pieces with excitement, but getting there just the same; the big White delivery wagons bobbing up and down, followed by their brothers and all holding big white blankets before their faces; the other steam carriages puffing away, with clouds of steam showing behind and probably all wishing they had one of these same blankets! The steam carriages and many of the gasoline carriages had that stunted appearance due to too short wheel base, too small wheels and too high build, very much like a salt box on rollers.

Then came the little Frenchy Darracq car, low built and rakish, and the big Packards, rather heavy, perhaps, but with one great redeeming feature—get there.

Then there were the great Panhards and Pope-Robinson cars, resplendent with Billey lamps, like great demon eyes, French horns with "dust no you dont's" over their mouths and a great tail winding around somewhere to a "press the bulb and I squeak" arrangement somewhere near the steering wheel; great hubs and big brass nuts, like the wheels of Juggernaut, all set off by a frame of brightly polished brass trimmings and brilliant red paint! All this in contrast to the American product of our leading builders, which have plain but elegant lines and a simple businesslike appearance that at once appeals to a mechanic.

Returning back to the starting point we found Elmer Apperson busy changing the tension spring which holds the circulating pump pulley against the engine flywheel. A look at the back of the machine showed the magneto, which is depended upon for ignition, to be supported at the end of a wide flat spring. The spring is evidently intended to press the pulley against the flywheel.

A little further down the road the "Fiat," the Italian machine, had come to grief. The cover of the transmission case was off and



SKETCH SHOWING FRACTURE IN "FIAT" TRANSMISSION.

revealed the trouble. The transmission resembles the usual Daimler sliding gear. The case was made of some aluminum alloy, and the rib supporting the main gear shaft was cracked. The operator explained that some two weeks ago the machine was backed and that the sprag caught and stopped the machine suddenly, placing a strain on the gearing. Be that as it may, the break was interesting, as showing how much thicker aluminum castings required to be than good tough bronze.

I have shown about how the break occurred. The crack at *a* nearly separated the bearing for the main transmission shaft from the case. The car could only be run on the second speed; any attempt to run on the high speed threw the gears badly out of mesh. The rib was about 1½ inches wide on top, but had been undercut to save metal, so the lower web was not over ⅛ inch thick. This might have answered if of bronze, but was altogether too light in aluminum.

We ran back over the course about 1½ miles, as it was stated that there still were two cars to arrive, but, as they were nowhere in sight and it commenced to rain, we put for home in our little Olds.

Most of the vehicles made but little noise, smoke or odor, but B 38, gasoline car, passed us belching forth more smoke than any steam carriage when it is first fired up, and the steam carriage B 80 made such a roar and belched forth such a cloud of steam as to cause one to think the pistons were leaking badly.

Altogether the run and record were most satisfactory and in marked contrast to those of even a year ago, and prove better than anything else how reliable the modern automobile has become and how very far removed it is from the experimental stage.

ON THE RETURN.

The contestants in the endurance run began to arrive in Worcester from Boston at 11 a. m. Monday and by 12:22 sixty-seven of them had arrived.

The rain of yesterday left the roads muddy and slippery. From three parties we heard of vehicles which skidded coming down hill, and finally were headed directly up the hill they had come down. Quite a number punctured tires on the way and there were several tires changed during the noon hour. B 16, Ward Leonard car, was reported as breaking an axle. It arrived, however, at 1:15 p. m. with the right front tire flat.

The steam carriage of the General Electric Company, although not entered in the contest, was going over the course. At the time we saw it it was in front of Robinson's store having a punctured tire replaced by a new one. When the carriage started there was considerable smoke from the burner and a strong odor of half burned kerosene. There was no water glass to watch and the carriage started off without visible steam or noise, in great contrast to the other steam carriages.

The vehicles began to start away at 12:40, the first to start being B 47, P. H. Deming in a White. The vehicles started on a slight grade after leaving the control, and as the police had threatened to arrest all who went at over 8 miles per hour, it was necessary to start very slowly. In the case of the gasoline carriage this developed rumbling gears, clicking clutches and a jerky motion of the vehicle, which would generally be absent on the high speed gear. There were several which had either a poorly working carburetor or else too much cylinder oil, for they smoked badly, the worst offenders in this respect being B 38, C 29 and B 12.

The steam carriages nearly all showed wet steam, and B 60 was belching water from the exhaust pipe. There was great difference noticed in the general noises about the machines. Several of the cheaper machines with high speed motors were very noisy, noticeably B 77, B 5, B 70, B 13, B 45, B 32. The big cars—C 2, C 4 and C 42—were more noisy than seem necessary.

The big Panhards made one h breath when, in shifting gears, th sawed one another for a few secon otherwise they started off very nicel Wintons and the car of the Intern Motor Car Company ran very quie one of the very best in this regard Automotor, which ran as quiet as a car.

All summed up the accidents w and ordinarily trivial, such as wc easily repaired on the road. Th concerns, as would be expected, sh best workmanship, as a rule, judged smooth running of the cars, and all appear to be very readily and quick trolled. WILLIAM V. I

Table of Operators and Obse

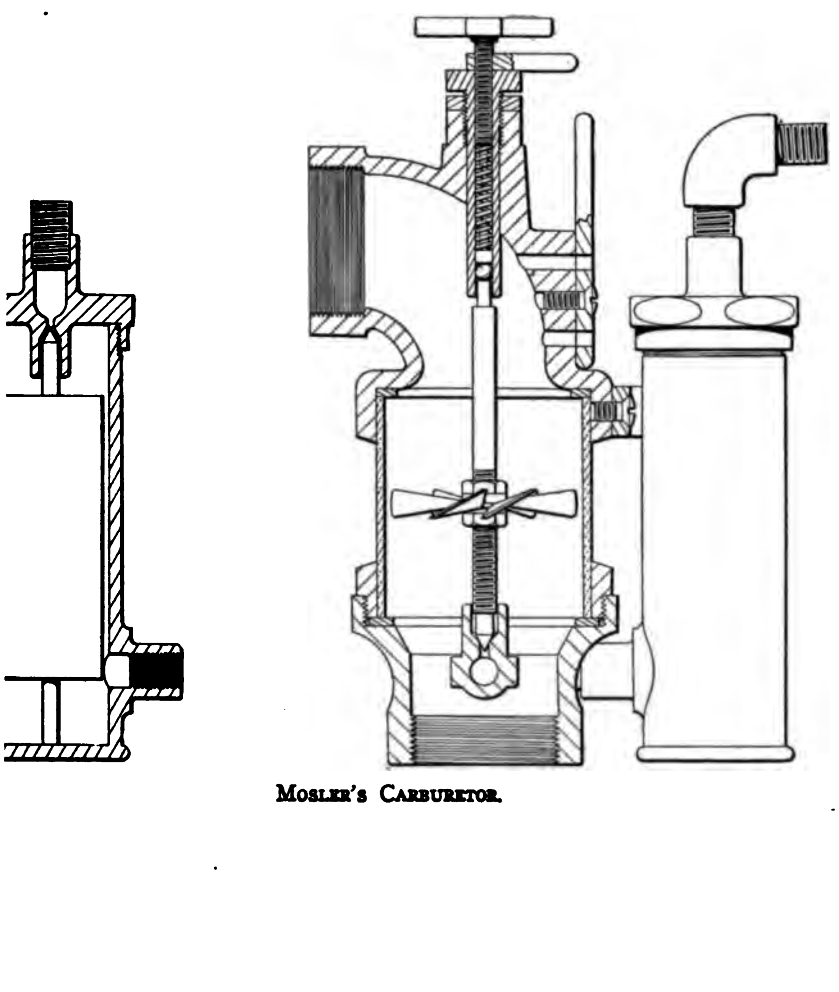
Driven by.	Obs
A 20—P. P. Pierce..........	Fred (
B 21—H. H. Brown.........	C. H.
C 23—E. Apperson.............	A.
B 24—P. H. Deming........	E. P.
B 25—W. T. White.......	E. W. W
B 26—G. S. Waite.........	J. I. S
B 27—A. J. Scaife.........	E. P. M
B 28—M. R. Hughes........	A. L.
C 29—A. L. Riker...........	W.
B 30—F. J. Duryea..........	C. H.
B 31—O. P. Nestman.......	J. P. I
B 32—A. Gardner...........	G. H.
B 33—C. B. Grout........	H. W. I
C 34—S. T. Davis, Jr......	H. N. I
B 35—R. S. Davis........	H. C. E
B 36—Murray Paige....	J. D. Woc
B 37—H. L. Newton.........	J. A.
B 38—I. F. Newcomber..	F. M. Da
B 39—K. A. Skinner........	C. F.
B 40—Mr. Willard............	W. I
A 41—F. F. Cameron............	
C 42—L. J. Sackett..........	E. F.
C 43—B. Smith...Mr. Kennedy—	E.
B 44—F. A. La Roche........	Mr.
B 45—S. O. Averell...........	Mr.
B 46—F. H. Fowler..........	S. Y.
B 47—H. A. Knox........	C. C. Bı
B 48—C. S. Mason.........	Dr. H.
B 49—C. H. Tangeman...	W. E. R
B 51—W. A. Sweet........	W. K.
C 52—Percy Owen.....	M. M. Belc
A 54—Dr. J. F. Hovestadt..	M. P. \
B 55—E. A. Riotte..........	F. G.
B 56—T. Weigele...........	E. H.
B 57—C. L. Sheppy............	H.
B 58—Gaston Plontiff....	G. DeW.
C 59—C. E. Proctor.........	H. M
C 1—H. W. Whipple.........	J. I
C 2—Mr. Jay................	J. I
C 3—G. L. Weiss.............	M
C 4—F. C. March.......	E. S. Bc
B 5—H. M. Wells.........	J. E. I
B 6—F. L. Dodgson........	H. M
B 7—J. Roosa............	J. F. P
B 8—O. K. Raymon........	W. S
9—Pope-Robinson.............	
C 10—E. Haynes...........	F. W.
B 11—F. N. Dutton.....	C. M. Ch

Driven by.	Observer.
/. Evans	W. R. Smith
C. Chase	H. D. Meiers
. G. Fleming	C. Z. Newell
. Apperson	Mr. Swetland
. W. Aurig	L. Addicks
'. E. Pierce	W. A. Warren
/. J. Gould	F. L. Swetland
. Grout	W. P. Stephens
[. H. Winners	R. H. Scranton
:. M. Owen	B. E. Levey
'arl H. Page	H. O. Joerns
.. P. Smith	L. S. Wheaton
S. Bunting	
'. T. Gaither	C. B. Barber
. J. Holley	R. H. Toney
'. S. Ourish	P. M. Heldt
'r. M. A. Carman	Harry Squiers
:. L. Brown	R. Shearer
.. A. Greene	M. C. Reeves
. H. Wilson	T. H. Ellis
V. A. Frederick	J. G. Perrin
. Densmore	L. Richmond

'he Mosler Carburetor.

:companying line cut and half tone : the carburetor of Arthur R. Mos- Broadway, New York. It consists at chamber, float, spraying nozzle, an, regulating valves and means for ljustment. The fuel (gasoline) is l to the float chamber at the top, m in both the full and sectional f the latter. Near the base is an which is lower than the spraying The level of gasoline in the float r is higher than the nozzle, so that flows to the nozzle by gravity.

the motor is running air is drawn : spraying chamber and eventually to the motor through the elbow. On its way up it induces the fan to revolve rapidly. The latter rises against the pressure of the coiled spring and with it goes the needle valve, which allows the fuel to be spouted into the spraying chamber. The fan serves not only the purpose of opening the valve, but mixes the gasoline fumes with the air. To adjust the needle valve and the flow of gasoline, the screw which presses on the coiled spring may either be set or a valve between the float and the space below the nozzle—not shown in the cut—may be regulated. To prevent binding a ball is inserted between the stem to which the fan is secured and the pin on which the coiled spring rests. The spring is surrounded by a sleeve, which may be adjusted so that a wide range of adjustment of the former is provided for. The chamber in which the fan revolves is a glass tube, which has joints that are packed with cork. To further regulate the mixture a plate with numerous small holes is attached to the elbow casting. By turning it to its proper position the speed of the fan can be regulated.



Mosler's Carburetor.

MOTOR VEHICLE PATENTS..

United States Patents.

710,410. Hydrocarbon Burner.—Stanislaus Berens, Lagrange, Ill. October 7, 1902. Filed April 14, 1902.

710,483. Internal Combustion Engine.—Patrick F. McCallum, Fairbank, Helensburgh, Scotland. October 7, 1902. Filed February 13, 1902.

710,485. Variable Speed Gear.—Charles M. Manly, Washington, D. C. October 7, 1902. Filed October 22, 1901.

710,486. Starting Mechanism for Prime Movers.—Charles M. Manly, Washington, D. C. October 7, 1902. Filed November 23, 1901.

710,500. Variable Speed Gearing.—George E. McElroy, Brooklyn, N. Y. October 7, 1902. Filed January 23, 1902.

710,508. Safety Stop for Automobiles.—Charles A. Ott, Pawtucket, R. I. October 7, 1902. Filed February 7, 1902.

710,562. Pneumatic Tire for Vehicle Wheels.—Pierre de Caters, Berchem, near Antwerp, Belgium. October 7, 1902. Filed October 22, 1901.

710,595. Cushion Tire.—Charles Miller, Binghamton, N. Y. October 7, 1902. Filed October 29, 1901.

710,597. Speed Controlling Governor.—Homer M. Motsinger, Pendleton, Ind. October 7, 1902. Filed February 15, 1902.

710,630. Motor Vehicle.—Charles F. Thoms, Highlandtown, Md., assignor of one-half to David Wright, Highlandtown, Md. October 7, 1902. Filed June 20, 1902.

710,647. Speed Regulator for Explosive Engines.—Louis W. Witry, Waterloo, Ia. October 7, 1902. Filed June 11, 1901.

710,685. Friction Clutch.—Louie J. Harris, New York, N. Y. October 7, 1902. Filed February 6, 1902.

710,727. Explosive Engine.—Walter G. Wilson, Westminster, England. October 7, 1902. Filed November 1, 1900.

710,728. Valve and Valve Mechanism for Gas Engines.—William O. Worth, Chicago, Ill. October 7, 1902. Filed May 28, 1900.

710,769. Motor.—William T. Fox, Rochester, N. Y. October 7, 1902. Filed January 13, 1902.

710,771. Sparking Device for Explosive Engines.—Theodore S. Glover, East Norwalk, Conn. October 7, 1902. Filed April 15, 1901.

710,809. Truck Frame for Motor Cars.—Albert Schmid, Havre, France. October 7, 1902. Filed January 28, 1902.

710,841. Mixing Valve for Gas or Gasoline Engines.—Alanson P. Brush, Detroit, Mich. October 7, 1902. Filed June 10, 1901.

710,840. Valve for Gas or Gasoline Engines.—Alanson P. Brush, Detroit, Mich. October 7, 1902. Filed October 4, 1900.

710,844. Drive and Brake Mechanism for Velocipedes.—James S. Copeland, Hartford, Conn. October 7, 1902. Filed February 4, 1901.

710,870. Storage Battery.—Henry P. King, Osgood, Ind. October 7, 1902. Filed May 16, 1902.

710,909. Dumping Vehicle.—Gotthilf R. Werner, Colby, Kan. October 7, 1902. Filed March 25, 1902.

710,928. Multiple Oil Feeder.—Alexander Winton, Cleveland, Ohio. October 7, 1902. Filed June 20, 1901.

MINOR MENTION

The Worcester Automobile Club has been revived.

R. H. Robson, Salem, Mass., is to erect an auto repair shop on Boston street.

Ihrig Brothers, Goshen, Ind., have secured the Olds agency for Elkhart County.

The Sterling Automobile Company, Sterling, Ill., has been sold out by the sheriff.

The automobile factory which was projected at New Concord, Ohio, is reported abandoned.

The Noble Automobile and Manufacturing Company, Cleveland, Ohio, has been attached for wages due.

A dividend of 30 cents has been declared in the receivership of the Steam Vehicle Company of America.

An interstate automobile association, to include auto owners of Kansas and Missouri, is talked of at Kansas City.

The Toledo Motor Carriage Company has purchased the business of F. H. Wilson, Oldsmobile agent in Toledo.

The Jackson Automobile Company, Jackson, Mich., is refitting the Heyser mill property for an automobile factory.

The American Motor Carriage Company, Cleveland, Ohio, has been incorporated under Delaware laws with a capital of $500,000.

The Sterling Automobile Company will build a large factory at Cleveland, Ohio, for the manufacture of steam trucks said to be of original design.

The Kansas City park board refused to allow the training of horses to the sight of automobiles to be carried on in the parks, as announced last week.

The Ohio Automobile Company, Warren, Ohio, will place on the market soon a 24 horse power four cylinder tonneau, with bonneted motor in front.

The Sterling Power Vehicle Company, capital $1,000,000, has been incorporated in New Jersey by Richard H. Dana, John F. Jewell and George Herbert Taylor.

The Overman Automobile Company will remove its entire plant from Chicopee Falls, Mass., to Bridgeport, Conn., consolidating with the Locomobile Company.

Major R. P. Davidson's motor gun carriage made a successful run last week from the Highland Park Military Academy, north of Chicago, where it was built, through Indianapolis, to Washington, D. C., to participate in the G. A. R. celebration.

"Escaped electricity is likely to prove harmful to the rider by producing irritability of the nervous system, and in many cases severe headache," says a writer on automobiles in the New York *Tribune*, basing his statement upon the authority of a physician. How can the theory of this action be brought in harmony with that of the alleged beneficial effects of the electric belt?

Dion Geraldine has opened an automobile storage and repair station at Los Angeles, Cal.

The National Automobile Company, Oshkosh, Wis., report orders for thirty-three touring cars as a result of their recent Chicago trip.

The J. Stevens Arms and Tool Company, Chicopee Falls, makers of the Stevens-Duryea gasoline machines, are reported to have parts for 200 of them under way.

The Burtt Manufacturing Company, Kalamazoo, Mich., has absorbed the Automatic Machine Company, same place, and will manufacture gasoline automobiles.

The Oregon Short Line is seriously considering the introduction of a line of automobiles between Monida Station and the Yellowstone Park, a distance of 60 miles.

In the list of automobile clubs published in our number of October 1, the secretary of the Dayton Automobile Club should have been Dr. W. Webster Ensey, No. 405 South Brown street.

The Ralph Temple and Austrian Company, of Chicago, has been incorporated with a capital of $30,000. The incorporators are Arthur L. Schwartz, Carl Hess and Harry Goodman.

H. J. Haas, for many years assistant superintendent of the Lozier Manufacturing Company and other bicycle concerns, has been appointed general superintendent of the E. R. Thomas Motor Company.

William Metzger, promoter of the Detroit races, which have been postponed several times because of wet weather, announces that they will take place October 24 and 25 if the track is in condition.

If the new racing car which is being built by Harry W. Sumner for Edw. Wilbern, of Cincinnati, Ohio, proves the success expected, it is reported that a company will be organized there to manufacture it.

The Automobile Club of Minneapolis has been incorporated with E. J. Phelps as president, G. C. Christian vice president, Sewall P. Andrews secretary, and Louis B. Newell treasurer. There is no initiation fee and the annual dues are $5.

Joseph Lester has begun a suit against Thomas & Post, brokers, of New York, and the directors of the General Carriage Company for an accounting, alleging mismanagement in the conduct of the company's affairs.

The Hoffman Automobile Manufacturing Company, Cleveland, Ohio, has passed into the hands of a number of local capitalists and the following board of directors has been chosen: Daniel Shurmer, T. F. Newman, A. D. McLachlan, L. E. Hoffman, A. T. Hatch, F. S. Masten and E. D. Shurmer. The directors have elected the following officers: President, E. D. Shurmer; vice president and general manager, L. E. Hoffman; secretary, T. F. Newman, and treasurer, A. D. McLachlan.

We acknowledge receipt of a copy of "Two Thousand Miles with an Automobile," by "Chauffeur," published by J. B. Lippincott Company, Philadelphia, and sold at the price of $2. A review will appear in a later issue.

According to notices in the daily press, Marconi, of wireless telegraphy fame, has invented an automobile. A very vague and unlikely description is given. It is electric, and has an almost unlimited mileage, and a speed of 38 miles an hour.

Charles F. Putnam, president of the Wachusett Automobile Club, Fitchburg, Mass., has had his barn remodeled at his own expense into a clubhouse and storage station for the club members. Membership in this club is not restricted to owners of automobiles.

The Locomobile Company of America advise us that one of their regular model locomobiles won the highest award in Class B, cars selling for £200, in the recent English reliability trials. They also report that Prince Henry of Prussia has purchased a locomobile.

We have received from the Standard Automobile Supply Company, of Philadelphia, a model of their smoke cap for steam carriages, consisting of a glass tube with a sheet metal top formed similar to the smoke cap. Within the glass tube there is a light ball of cotton waste. If one blows at the sheet metal top the cotton ball invariably rises, showing that the draught is always upward.

Russell A. Alger, Jr., Henry B. Joy, R. P. Joy, Fred M. Alger, Charles A. Ducharme, D. M. Ferry, Jr., John S. and Truman Newberry, Joseph Boyer, and W. C. and Philip McMillan have acquired a large interest in the Ohio Automobile Company, Warren, Ohio, and the capital stock of the company has been increased to $500,000. A new board of directors, consisting of the Packard brothers, George L. Weiss, Truman Newberry, Henry B. Joy, Philip H. McMillan, Joseph Boyer and R. A. Alger, Jr., has been chosen, and the works will be moved to Detroit as soon as a suitable site can be procured.

The firm of Straley, Hasbrouck & Schloeder, counselors at law, 257 Broadway, New York city, which has conducted a department devoted to soliciting patents, trademarks, etc., and litigation affecting same, has now placed this branch of its business in charge of C. Augustus Dieterich, formerly of 229 Broadway. With the improved facilities the firm is in position to take complete charge of the legal business in all its phases of large corporations, manufacturing concerns and individuals, which business they are now obliged to entrust to different attorneys who are specialists in the particular branches to which the services may pertain.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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THE HORSELESS AGE.

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The Reliability Contest.

As a means of demonstrating the reliability of the modern automobile the 500 mile reliability run of the A. C. A. was certainly a great success. Out of seventy-five vehicles which started in the run, sixty-eight completed the journey of nearly 500 miles, having conformed in nearly every case to the rule restricting the repairs to such as could be made with the parts carried along and with the aid of available local help. In no former contest of this length has the proportion of the number of arrivals to the number of starters been so large as in this. The industry owes a debt of gratitude to the Automobile Club of America for having organized this contest and carried it through so successfully, and much praise is due the officials of the contest, who have very creditably acquitted themselves of a most difficult task.

We do not mean by this to imply that the contest was in all its details beyond criticism. While it was a decided improvement over last year's contest, there were still some objectionable features connected with it, for some of which the organizers were responsible and for others the contestants.

Doubt was expressed repeatedly as to the impartiality of some of the observers. No regular accusations have been made, so far as we know, and the committee may be expected to thoroughly investigate every case where there is a suspicion as to the correctness of the report.

The method of assigning observers is capable of improvement. The latter should be assigned publicly by lot, instead of privately, and should be assigned to a different vehicle every day. This method would offer a much better guarantee of impartiality. Above all the observers must be of character above reproach and technically competent in the subject.

The system of awards, we think, has also proved defective. According to our interpretation of the rules, and judging from the official times, about 90 per cent. of the vehicles that came through and will receive awards will receive first class certificates. First honors were thus a little too easy. The situation might have been considerably different if there had been much rain, as in last year's contest; but the results have demonstrated what we have suggested before, that not the average speed but the reliability marks should be the basis of awards, and that the range of performance entitling to first honors should be more restricted.

Another defect of the regulations was that time lost in penalized stops could be made up by speeding. Of course, contestants were not supposed to make an average of over 14 miles per hour; but the rules indicated that time lost in penalized stops would be counted as actual running time, which, of course, made speeding above the legal limit an advantage in case a machine had penalized stops. To illustrate by a somewhat exaggerated example: Supposing the regular minimum time in any section, calculated on a 14 mile an hour basis, was four hours. Then, if a machine had two hours of penalized delay en route and made the entire distance at an average of 28 miles an hour it still had a perfect record so far as qualifying for a first class certificate was concerned.

Non-penalized stops, on the other hand, did not count as running time, and a misunderstanding of this rule, it is now said, will deprive some of the steam machines of a perfect score. The steam machines were allowed a certain time in each section for replenishing their water and fuel supply, and time thus spent was to be added to the minimum time to be spent in covering that section. Some of the steamers made up for the time thus lost and reported at controls within the absolute minimum time.

Another question which has come up before the committee is that of detours made purposely to avoid getting into controls ahead of time, and question blanks have been addressed to all of the official observers inquiring whether detours were made for this purpose, whether any detours were made at all beyond those at Windsor, where the road was being repaired, and at Marlboro, where the arrows were missing; and, further, whether the operator allowed his vehicle to run backward down hill and the engine to gain speed, and ascended in this manner.

Many questions of this sort will undoubtedly come up, and the committee may have cause for disqualifying certain

vehicles, but of course they are allowed considerable latitude in their dealings with violators of the rules, and it remains to be seen what degree of leniency they will show.

One foolish incident common to all contests of this kind that have been held is that contestants do not content themselves with trying to make the best possible official records, but indulge in all kinds of secondary contests not on the program, such as being in first at controls, racing on hills (or on level road), etc. A number of the contestants have impaired their official records by these foolish acts. A contest of this kind should be regarded as a business affair pure and simple, and the sportively inclined among the contestants should repress their inclinations for the time being.

One observation made on the run that was a satisfaction to all was that in this part of the country few horses now take fright at an automobile. The education of the road and city horse in auto frequented districts has been nearly completed. Those whose horses are as yet more or less frightened by the sight of a passing automobile took advantage of this occasion and had their steeds by the roadside to see the procession. Only a single runaway, and that of a horse left untied on the street, is said to have been caused during the whole run.

In the matter of repairs at the night control stations there was a large difference as compared with last year. The official program gave a list of the repair stations at each control, and it was to be expected that those needing repairs requiring a machine shop equipment would proceed to these repair shops. However, a representative of The Horseless Age, who visited the various shops, never found any contesting vehicles there. The lists of arrivals, moreover, show that little repairing was being done, except during noon hours and the two hours before the start in the morning. The results of the contest ought to convince the hesitating that automobiles have now been brought to a state of perfection that justifies full confidence in their reliability. Those who have not actually witnessed the trials are likely to form erroneous impressions of the relative difficulty of the test to which the machines were subjected, as an average of 14 miles per hour may seem low. It should therefore be explained that, owing to the rule allowing time lost in penalized stops to be made up, and for other reasons, many of the vehicles made a considerably better average than this in the first part of each section, particularly the smaller machines, which seemed to be especially anxious to demonstrate their speed capacity. When it is further considered that in some of the sections the roads were very poor and hills from 8 to 12 per cent. were plentiful, it will be admitted that the run was a much more severe strain on the machines than a cautious driver would subject his machine to in a private tour. From Springfield to Worcester, for instance, an average speed of 10 miles an hour would be very good for a small vehicle, and should not be exceeded in ordinary touring for considerations of comfort and the endurance of the machine.

In conclusion it may be said that the route was well chosen, and the rules, with the exception of some minor details, well formulated. The management and execution of the trials were excellent, and the event is bound to prove of great and lasting benefit to the industry.

Features of Some New Machines.

Every automobile endurance or reliability contest that has been held in America has brought some make of machine or several into prominence, and in this respect the contest which has just come to an end will be no exception. All the new machines in the contest were gasoline machines. It is, of course, not yet officially known which of these have made perfect reliability records, but a number of the newcomers exhibited qualities that appealed strongly to the practical men who inspected them.

Quietness of operation, great hill climbing power and very efficient throttling of the engine when the vehicle is standing are the most important of these qualities. It was a surprise to many to see some of the light machines climb grades of 8 per cent. and over on the high gear, while on the level they would run at a 20 mile gait, proving that they were not specially geared for hill climbing. Much interest centred in a new embodiment of the air cooling principle, and close watch was kept on this machine in the run from Boston to Worcester, which is almost continuously uphill, a condition decidedly unfavorable to air cooling. The little machine ran as regularly as ever on the hills, however, passing practically all others on the steep grades and arriving at Worcester on schedule time. In flexibility of control and in noiselessness the machine is perhaps as close an approach to the steam carriage as has yet been attained in the gasoline line; its substantial axles and flexible springs are features of value, but the design will bear improvement as to general appearance.

Another machine which will gain in popularity as a result of its record in the contest is a double opposed cylinder machine, which possesses the features of neatness of body design, great hill climbing power and quietness of running. A new representative of the single horizontal cylinder machine with planetary transmission exhibited these same qualities, and in addition that of thorough protection of all working parts.

The vehicles which made their reputation in former contests of this kind sustained it in this one, and the several new touring cars in the contests also gave a creditable account of themselves, although their performance did not compare as well with that of the lighter machines as it should. This may be partly accounted for by the fact that all of them are only recently out of the factory.

The foreign contingent in the contest was small and the showing made is practically that of American cars. Far be it from us to deprecate the work that has been done in Europe, as we are perfectly aware that in some points, such as excellence of finish and perfection of details, we have yet much to learn from the best European manufacturers. But the record for reliability and regular running here established by American cars is one that will stand comparison with any ever established in Europe.

Our Staff in the A. C. A. Run.

The Horseless Age was represented in the outward run by thirteen official observers and on the return by fourteen. We also had resident correspondents at five of the controls. Our report was the first complete account of the contest published, containing illustrations of the finish and a table of all the times of start and arrival, which figures were *official*, and not unofficial, as erroneously stated. In the present issue we publish a number of general conclusions by technical representatives who took part in the run.

Legislative and Legal number, issue of November 5. On automobile legislation at home and abroad.

Conclusions on the Reliability Contest.

By Albert L. Clough.

The 500 mile reliability test must have contributed most substantially to the advancement of the industry. Perhaps it will not be found to have given the impetus to the automobile industry which was derived from the New York-Buffalo run, but this may be explained from the fact that the automobile is very much further advanced than at that time and has already secured a prominent and important position. At that time the motor vehicle badly needed a public demonstration of its mere practicability, and received it in a very forceful manner from the Buffalo run. This year no one doubted that automobiles could be operated for long distances over common roads, and the test was of more technical than public interest on this account, and threw light more upon details of system and design than upon the general practicability of the automobile proposition.

While the New York-Boston course offered a far less severe test upon the vehicles than did the New York-Buffalo route, yet it was a practical test both as regards roads and distance covered. There were plenty of hills and rutted roads to be encountered, although the greater part of the mileage was over improved highways. Had a rainy day or two been encountered, as was the case during last year's run, of course the test would have been far more exacting, particularly as a test of the ignition devices of the gasoline cars.

As an advertisement for the successful competing manufacturers, the present test cannot prove nearly so valuable as that of last fall. So large a proportion of the vehicles came through with comparatively clean records that little pre-eminence will probably be enjoyed by any particular contestants. There is little glory to be won in a competition in which success is so general.

Automobiles are so much a matter of course in the populous district through which the route lay that the large and curious crowds of last year were not met with in this run. The people who did gather about the machines at the controls showed that public knowledge concerning the finer points of automobile construction had displaced an unenlightened and somewhat idle curiosity. Nor has the education been all confined to the human species. The horses along the line show that they are accepting the new order gracefully, and the majority of them seem to meet the "puffing wagon" without hardly so much as a shy.

It is perfectly surprising to note the large number of motor vehicles which are owned through this section. At every crossroads and village handsome rigs were lined up, and gave the passing vehicles a brotherly toot of their horns.

There certainly must have been "something doing" among the manufacturers recently.

Every observer upon the run must be ready to bear witness to the very courteous and liberal treatment accorded him by the A. C. A., and every contestant must have been impressed with the perfectly fair and impartial manner in which the affair was run.

The committee and the officials of the club labored early and late for the success of the test and the comfort of the participants. It is certainly fortunate for the industry that such gentlemen are willing to give their time and effort to its advancement.

There is one fact in connection with the test which is particularly impressive. With seventy-five competing vehicles upon the road and hundreds of privately owned automobiles along the way, in addition to all the horse drawn teams; with much of the road leading through populous towns, with their trolley cars and other ordinary traffic, there is yet to come to my knowledge any road accident which involved the slightest injury to any individual. Human nature is still averse to being passed upon the road, and there were doubtless a good many lively brushes and much passing, due to the varying speed qualities of the vehicles, and yet no accident to life or limb is reported. After this splendid demonstration of the controllability and inherent safety of the automobile it is up to the funny papers to find some new cartoon subject to take the place of the fictitious "runaway automobile." It is hardly conceivable that seventy-five horse drawn vehicle could have made this trip without having to record many serious smashups.

It is rather to be regretted that no arrangements were made to secure a record of gasoline and water taken on at each control. While this would have involved a large amount of labor, it is believed that the value of the data obtained would have justified it. Non-penalization for stops due to tire defects proved to be a most suitable arrangement. There is certainly no reason why an automobile manufacturer should be penalized for the shortcomings of any notoriously unreliable part of his vehicle, which he is forced to buy upon the assurance of another man. If tire troubles had been penalized there would have been very few clean records made.

Unreliable Parts.

Spark plugs and coils are both articles which are not ordinarily made by the automobile manufacturers, and they are both unreliable and likely to break down in use, and the question may be asked whether it would not be well to make stops due to them also non-penalized.

The reliability of the gasoline vehicle, as regards its freedom from necessary stops for minor adjustments, was apparently far from being demonstrated in this run. Out of fifty-two vehicles which the writer saw stopped upon the road, forty-five were gasoline and seven were steam. There were, of course, many more of the former than of the latter in the test, but not a large enough preponderance to account for this. One can only conclude that ignition and other difficulties are still farther from being completely eliminated among the explosive vehicles than could be wished. It is quite possible that owing to the greater popularity and the enhanced demand for gasoline vehicles the manufacturers of this class have devoted themselves more to filling orders than to the working out of the details which make for reliable operation, and it is not unlikely that the makers of steam vehicles have been urged to a most careful attention to each minor point in order to hold even the somewhat secondary place which, it must be admitted, the steam vehicles have occupied during the present season.

A great many of the stops of the gasoline vehicles which were noted appeared to be due to ignition troubles, but probably a somewhat larger proportion of them were due to tire troubles than was the case with the steamers, owing to the extreme weights of some of the gasoline vehicles. Not only upon the road did the gasoline vehicles fail to give an impressive demonstration of their reliability, but at the controls there was a decidedly greater amount of tinkering done upon them than upon the steamers. This tinkering was mostly confined to the ignition apparatus—that bête noir of the gasoline system—and plugs were often seen removed for cleaning, vibrators being adjusted and contact devices being inspected. Nor is this strange. Contact devices unprotected from the elements, careless wiring, faulty coils and excessive cylinder lubrication are still common faults. Many gasoline cars were seen missing explosions. Some even left the controls in this condition, and the muffler explosions and other irregularities which were noticed among the machines in line furnished audible evidence of the uncertainty of the sparking apparatus used.

Lubrication.

Many of the gasoline machines made a villainously smoky exhaust, which evidenced an improper disposition or excessive amount of the lubrication. At the start from New York this was particularly noticeable, the operators evidently taking the view that too much oil is better than too little. There was one light gasoline machine which carries its motor in an anomalous position, that produced an amount of oil smoke which placed it in a most unfavorable light. There was one practice adopted upon the machines, both steam and gasoline, which furnishes a pertinent commentary upon the state of the art of enclosure and protection of working parts. Nearly all of the machines were equipped by their operators with temporary aprons of oil cloth or other material, hung under the mechanism to keep out the mud. This is nothing more or less than a frank admission that the ma-

chines as supplied by the manufacturers are "fair weather vehicles" and likely to be put out of commission by wet roads. If protection for the driving mechanism is needed, why is it not put on at the factory?

ON THE HILLS.

It was rather interesting to note the relative performance of the different classes of vehicles upon the hills. Some of the very light and low powered gasoline runabouts and of the very heavy gasoline touring cars were forced to reduce their gears very early and were passed by many of the medium weight gasoline cars having direct transmissions from large low speed engines and also by many of the steamers. It must not be forgotten, however, that the heavy gasoline touring cars have enormous speed possibilities upon the level which they were not allowed to exhibit.

The New York-Boston run was not nearly so severe a test upon axles and running gears in general as was the New York-Rochester test, as the roads were much better and the speed limited, as it was not last year.

As to tires, the fact that more and more of the vehicles are being equipped with the detachable variety is an indication that the use of unrepairable single tube tires is being found impracticable.

Conclusions from the Reliability Run.

By C. C. Bramwell.

Now that the Reliability Run is finished we have time to think over the various observations made, and also to compare this run with similar ones, both at home and abroad. In comparing our recent reliability run with other events of the same order, the first subject that suggests itself is the governing rules laid down by the Automobile Club of America, to be followed during the run and to form the basis of calculating the reliability marks.

Before attempting to criticise the A. C. A. or its rules, I wish to say that the club and its contest committee, as well as its secretary, deserve a great deal of praise for the thorough and painstaking manner in which the whole run was arranged. The hotel accommodations, as well as the arrangements for the care of the vehicles over night, were exceedingly well attended to, considering the number to be cared for.

There are, nevertheless, a few points that may well be considered at this time as being worthy of incorporation into future contests of this kind.

CLASSIFICATION.

The first point to be considered is the classification of the vehicles. Our clubs always classify by weight, while the English clubs do not consider weight, but price. In my opinion, the foreign way is the best, for most would be purchasers (and these are the ones for whose benefit such runs are made) are more interested in the price they have to pay than in the weight of the vehicle. Let us take an instance of how this "weight classification" may influence design. Suppose a given vehicle weighs 1,200 pounds, and that in the construction of this machine the designer has used cast iron for the engine base or crank case and also for his gear box. We will also suppose his cylinder is cast integral with the water jacket. Now, by making the motor crank case and gear box of aluminum and by making his cylinder with an aluminum water jacket machine fitted onto the iron cylinder, much weight can be saved. Add to this the metal that can be saved by turning up and boring out all surplus metal in the gears, clutch, etc., and further cut out all unnecessary weight in the upholstering and also in the body, and what is the result—a vehicle weighing just under 1,000 pounds, and therefore in the A class instead of in the B class. The vehicle will now, however, cost a good deal more, and the purchaser will have to pay probably from $200 to $300 more for the machine than formerly, and, what is worse, he will get a vehicle that is not so good for road work as the former one. On the other hand, the manufacturer gets into the A class instead of the B class, and therefore has an immense advantage in the final showing. As long as weight only forms the basis of classification, vehicles will have a lot of unnecessary and expensive machine work put into them to make them light. For this the purchaser has to pay. Again, a great temptation exists to make the parts too light and therefore turn out a frail vehicle.

Let us suppose that price determined the classification of the vehicle—is it not self evident that the manufacturers would aim solely to produce the best results for a given cost, rather than the best results for a given weight? Should price govern the vehicle's classification, the manufacturer could still not afford to use unnecessary weight, for his machine would not compare favorably with his competitor's who had been reasonably careful on this score. In other words, competition will keep down the weight.

Let me repeat—what the customer wants is the best vehicle for a given price. He is not at all interested in which is the best vehicle for a given weight.

A gentleman having $1,000 or so to put into an automobile desires to know which is the best machine for him to buy. He obtains a copy of the Automobile Club's report of this Reliability Run, but, instead of finding out what he wants to know, he is more mixed up than before. There is nothing said about the price, which is his governing condition.

I brought this matter up after the Buffalo run, expecting it would cause some discussion, but it did not. Perhaps there are good reasons for using the weight classification; cannot we hear from those believing so. It is an important point and worthy of considerable attention.

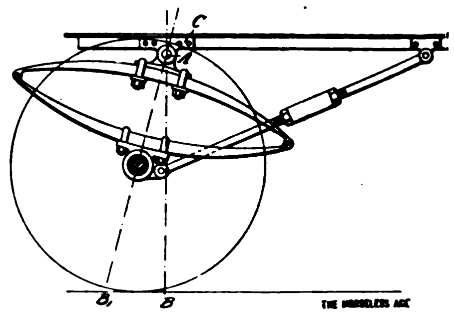
(To be continued.)

A Defective Method of Chain Adjustment.

By Hugh D. Meier.

The writer's attention was recently called to the method of chain adjustment which is shown in the accompanying sketch. A vehicle equipped with this system presented a rather queer appearance, owing to the fact that the chain, which had become slack, had been taken up by extending the distance rods. The rear axle was thereby caused to swing backward around the fulcrum A, and thus the imaginary line A B assumed the position A B_1. In the cut the angle A B B_1 is much exaggerated. The distance between the centre of the rear axle and the line A B need never exceed one-half the length of a chain link, and will not unless the man who is making the adjustment overlooks the fact that the removal of a link is all that is required.

In the case cited above there is no excuse for the present condition of the machine, inasmuch as it is kept at a storage and repair station and provision had been made by the manufacturers for shifting the bracket C. There are quite a few makes of vehicles in use, which have not been provided with means for securing the bracket in the proper position after the chain has been adjusted, and the need of such a device must, therefore, be emphasized. Obviously the springs, the frame



and the distance rods are subjected to strains which, in all such cases as the one illustrated, will bring about rapid deterioration of these parts. The usefulness of the springs is also impaired.

In the line cut the turn buckle is located incorrectly. Frequently it is placed midway between the fulcrum pins of the links, the object being to use links of the same dimensions. This is a bad practice and unwarranted. The tendency to buckle is the greatest half way between the eyes, where the turn buckle should never be placed. When running ahead the distance rods are, of course, under tension, but when running backward they are under compression and liable to give way when striking an obstruction. The tapped sleeve is not as good a form of construction as the turn buckle sometimes used, which has an eye at one end, and into the other end of which the link—in this case only one is used per distance rod—is screwed; the adjustment in this case need not be very fine. The latter type of fitting is simpler, neater and requires but one check

nut. One-half of a turn must be made, and constitutes the minimum amount of adjustment.

How to adjust the chain drive is a question that confronts every owner of a chain driven vehicle. In this connection it may be well to express the hope that in the future the instruction books that go with all such automobiles will describe the means provided and the method to be employed.

Alternating Current System of Ignition.

By Albert L. Clough.

Mr. Bramwell's proposal for an alternating current system of ignition is of extreme interest to all who are concerned with internal combustion motors. It is pretty generally acknowledged upon all hands that ignition is the weak point of the gasoline system, and while there is much which may still be done to perfect the existing jump spark system, it is certainly a desideratum to make such changes in principle as shall eliminate its most troublesome features. That the vibrator which interrupts the primary circuit of the coil deserves to be called the most despicable part of a gasoline automobile is hardly open to argument, and if it can be eliminated from the problem without giving place to worse evils, such change would be ground for legitimate congratulation. It is also a consideration of some value to be able to do away with the commutator of the direct current generator, but it is of no such importance as is the relegation of the vibrator, for the commutator is a comparatively well behaved piece of apparatus.

The system proposed is understood to include a multipolar alternating current generator, which must, almost of necessity, be a magneto; a step up transformer capable of giving the necessary voltage and the usual form of jump spark plug in its secondary circuit.

In the primary circuit would be included the ordinary form of contact making device carried by the secondary shaft of the engine. It would scarcely be practical to rely for the ignition effect, upon the discharge due to a single half period of the alternating current, but, on the contrary the circuit should be kept closed and the sparking continue, through a number of half cycles. In order that this may be the case and still allow for a sufficiently exact ignition point, the alternating current must needs be of quite high frequency. It becomes a question how to secure the necessary frequency and recourse is naturally had to many field poles in the generator and a high generator speed. Probably it would be found necessary to drive the generator through some form of centrifugally operated clutch in order to secure some approach toward a constant frequency and voltage at varying engine speeds. One may assume that a six pole magneto is about the limit of practical construction and that 2,000 revolutions per minute is about the limit of speed. If the engine to be sparked runs at 1,000 revolutions per minute its secondary shaft would run at 500 revolutions per minute; there would thus be 4x6, or twenty-four half periods of current per revolution of the secondary shaft. If one assumes nearly a half period to elapse between the discharges in the secondary circuit, it is obvious that there might be an inaccuracy of one-twenty-fourth of the engine cycle in the time of ignition, assuming the charge to ignite by the first spark.

This would mean an inaccuracy of one-twelfth of a revolution, or 30°, which is altogether inadmissible. It is to be feared that the impracticability of securing a high enough frequency may render this alternating system difficult of application.

It is not recollected that Mr. Bramwell mentioned the use of a condenser in connection with the system. If a condenser were not used, it is believed that it would be well nigh impossible to secure a discharge in the cylinder under high compression; for the secondary voltage which is directly produced from a smoothly undulating alternating generator current is also smooth in form and has a very low "jumping power," while the voltage generated by the nearly instantaneous mechanical break of the direct current coil has an enormous maximum of a sharply peaked form, eminently adapted for breaking down a gaseous dielectric. With a properly proportioned condenser in parallel with the secondary of the alternating coil, a multiple discharge could be secured every half period and the disruptive power of the mechanical break probably be equaled.

The proposition has often been made to make use of a generator giving a single current impulse per engine cycle and consisting of a magnet carried upon the secondary shaft which revolves in close proximity to a stationary armature in which an induced current is produced upon the passage of the magnet. As pointed out editorially, this arrangement possesses some ideal qualities. By slightly moving the armature concentrically with its revolving field, the spark position may be altered. Such an arrangement as this could hardly be expected to give sure results unless used in connection with a step up coil bridged by a condenser of such capacity as to secure conditions favorable for a multiple oscillatory discharge.

The question may be not unworthy of consideration as to whether the mechanical interrupter or trembler has received its full deserved development. There is one thing in its favor—there is plenty of power at hand to operate a mechanical multiple break, while, with the electric vibrator, the amount of power available to perform the desired function is so infinitesimal as to render the results exasperatingly uncertain, even when everything is arranged with some delicacy. One specially unfavorable feature of the electric vibrator's operation is that just when, through bad contacts or weak battery, the strength of each individual discharge is weakened; the chances are that the vibrator will cease to work and fail to produce a multiple discharge at all. The action is self aggravating. With the mechanical trembler there are still the chances for a full number of sparks, irrespective of the electrical conditions.

It is believed that the familiar form of mechanical trembler as employed by a well known manufacturing company, by no means exhausts the possibilities of the device. Several forms come to mind as worthy of a trial. At any rate the electrical vibrator (at least as at present applied to commercial spark coils) has been weighed in the balances and found wanting as a dependable part of a motor vehicle.

Some Deduced Results of the Reliability Trials.

Of eighty entries, seventy-five cars started in the run, of which sixty-eight, or 92 per cent., reported at the finish. The number of starters and arrivals in the various classes is as follows:

Class A, 12 starters, 11 arrivals (91.7 per cent.)

Class B, 45 starters, 40 arrivals (88.8 per cent.)

Class C, 18 starters, 17 arrivals (94.4 per cent.)

Gasoline, 55 starters, 50 arrivals (91 per cent.)

Steam, 19 starters, 18 arrivals (94.7 per cent.)

Combination, 1 starter, no arrival.

American, 68 starters, 62 arrivals (91.2 per cent.)

Foreign, 7 starters, 6 arrivals (85.7 per cent.)

Whatever may have been said about the better showing of the light machines, the greatest percentage of arrivals is in class C, and if the combination machine, which was rather an experiment, is counted out, every vehicle in this class that started arrived at the finish. In class A, on the other hand, there was also only one less arrival than started, but the machine which dropped out was not an experiment, but a good representative of the light class.

Following is a list of the number of vehicles missing at each control:

Arrival at Norwalk	2
Start from Norwalk	2
Arrival at New Haven	3
Start from New Haven	2
Arrival at Hartford	5
Start from Hartford	7
Arrival at Springfield	4
Start from Springfield	3
Arrival at Worcester	6

(*Continued on page 446.*)

(*Continued from page 445.*)

Start from Worcester	6
Arrival at Boston	6
Start from Boston	4
Arrival at Worcester	4
Start from Worcester	8
Arrival at Springfield	6
Start from Springfield	6
Arrival at Hartford	5
Start from Hartford	8
Arrival at New Haven	8
Start from New Haven	7
Arrival at Norwalk	7
Start from Norwalk	9
Arrival at New York	8

In this list vehicles towed in are counted as having missed the control.

Finish of Prescott, B 5.

Owing to illness J. Edward Baldwin, official observer on Prescott B 5, was unable to complete the second half of his report in time for publication in the last issue of THE HORSELESS AGE. In conclusion Mr. Baldwin states that "the car came through with a perfectly clean record, having made no stops, penalized or unpenalized, except at controls, and without a single repair. Not even a bolt or nut was touched. The only adjustment made was to tighten the chain at Boston and New Haven."

The car was driven by a temporary 5-16x 1 inch pitch Whitney bicycle chain, which, the observer reports, stretched only an eighth of an inch in the six days' run.

The following is a summary of the supplies used: Cylinder oil used, 1 quart; machine oil used, 1 gill; gasoline used, 49 gallons; gasoline per mile, .098 gallons; gasoline per ton mile, 1.36 gallons.

The Franklin Light Roadster in the Run.

The Franklin machine with four cylinder air cooled motor, which competed as B 45, was on time regularly at each control. Mr. Averell, the operator, states that he made a perfect run up to the morning of the fifth day. On that morning the ignition generator would not pick up. He attempted to make the morning run on the auxiliary battery, but by mistake connected his wires to the battery in such a way that he could not switch in the dynamo. The battery was not in good condition and took him only about 20 out of the 23 miles, and then laid down absolutely. But he managed to worry to the control with a stop of only three minutes and thirty seconds and a second stop of about 30 seconds. The sixth day's score was perfect.

On the hills the Franklin showed itself superior to many of the heavy machines. It was the only machine of its kind—i. e., air cooled without mechanical means—entered and was driven by a private party, a New York business man.

LESSONS OF THE ∴ ROAD ∴

Diary Notes of a User.

PART IV.

BY * * *.

(Continued.)

After increasing the size of the driven sprocket of my carriage I began to attempt some country driving. A trip was made to a neighboring city, 65 miles distant, with no serious trouble, the only stops necessitated being to tighten the driving chain and to take up the clutch a little. The relief cocks kept jarring open on the way, but this defect was easily remedied. When returning from this trip one cylinder of the motor suddenly ceased working, but a little inspection located the difficulty in the vibrator of the coil. The lock nut had jarred out of adjustment and came very near being lost. These vibrator adjustments ought to be greatly improved in order to become thoroughly practical. When the adjustment is correct some more positive method than a frictional check nut ought to be provided to maintain it.

BAD WIRE CONNECTIONS.

After running very well for 30 miles or so one cylinder again quit work. This time I discovered the defect in one of the battery connections. The man who had installed them had used common annunciator wire, and had neglected to tightly pack the spaces between the cells, so that they could not shift. The jolting of the carriage had moved the cells among themselves, and one of the stiff wire connections had parted. It was the work of but a few minutes to replace the defective connection, and to stuff the spaces between the cells with pieces of an old newspaper.

My clutch had been wearing badly all the way, and upon a steep hill a little farther along I found it would not hold on the low speed. It was taken up slightly, and I was able to proceed. When an investigation was made it was found that the oil holes were stopped up, so that the oil supplied them did not reach the clutch surfaces, which caused the clutch plates to cut very rapidly. It was thoroughly washed out with gasoline, and has worn very little since. There is hardly any portion of a motor vehicle which is more dependent upon thorough lubrication than the all metal clutch, and sometimes the means of lubrication are very insufficient and unhandy.

DISCONNECTED PIPES.

A few days after, when making a trip to a neighboring village, I suddenly noticed water escaping from beneath the carriage. Stopping instantly I discovered that the rubber circulating pipe, which connected to the upper side of the engine jacket, had become detached from its nipple, and the water was rapidly leaving the tank. By taking up the floor I was able to replace the pipe in time to save a part of the water, which was quite fortunate, as there was no house or brook for miles around.

The cause of this little accident was soon apparent. The parallel rod which operates by the throttle pedal, and which controls the valve throw of both cylinders, interfered with the circulating pipe when the throttle was opened wide, and had gradually worked it off. The manufacturers must have known this, but perhaps left it as a sort of a pleasant discovery for me. We filled our water tank at our destination.

On the return trip, when attempting to shift the sliding gears upon a hill, I found that they would not move. Everything seemed to be fully lubricated, and I fussed over the combination for a long time without effect, until, all of a sudden, they seemed to shift perfectly. I have never discovered the cause of this "kick up" or of similar ones which I have had since.

One evening when I had the carriage out for a trial the engine slowed down and finally stopped. I heard some liquid trickling down from the vehicle and immediately concluded that one of the water pipes had again become disconnected. As it was very dark my first thought was to light a match and investigate, but I realized that this was a bad thing to do about a gasoline vehicle, and instead I pushed the vehicle to a lighter spot, when I was horrified to find the gasoline pipe disconnected from the tank and the liquid running a stream upon the ground. The small copper pipe had been imperfectly soldered into the union, and the vibration had finally caused the break. I happened to be near a drug store, from which I procured some adhesive tape with which I was able to make a temporary repair sufficient to enable me to reach home. Probably I shall never forget that little lesson in regard to lighting matches, because it might have been so serious.

IMPURE GASOLINE.

When starting out a few days afterward I found I could not get the engine into operation, and commenced to make an investigation. One thing that I have learned is to refrain from extensive and fatiguing cranking if the engine shows an indisposition to start promptly. With modern apparatus brute force is quite unnecessary, and it is better to use one's head than one's muscles. A few tiny fibres of waste had in some way passed the gasoline strainer and lodged between the spraying nozzle and the spreading plate of the carburetor. When this was removed the motor started upon the first turn. How many things there are in gasoline besides gasoline! Sand, water, fibres and a substance which a friend of mine calls "frogs' eggs."

If there is any more noisome part of a motor carriage than the cylinder head gasket I do not want to have dealings with

it. Casting the cylinder and head integral must be one of the greatest improvements which have recently been made. I started out using the ordinary asbestos paper, and vainly tried all methods of making it hold. I soaked the gasket in linseed oil, moistened it in water and daubed it with shellac; but I never felt sure that the packing would hold, no matter how carefully I followed it up by means of the studs. Later someone introduced me to the asbestos packing which contains wire gauze, and I have tried several different kinds, but not with entire success. However, it is infinitely better than the ordinary variety.

One summer morning I started with a friend for a pleasure resort about 60 miles away. Although the roads were pretty bad we reached there without a stop, and averaged better than 15 miles per hour. This is my record "endurance run" thus far. And here I must say a word of praise for the rural horse. He is certainly getting over his fear of self propelled vehicles faster than one could have expected he would, and faster, apparently, than are his equally long haired owners. Two years before when I drove over the same road my progress was the cause of a nearly constant succession of equine gymnastics. On this trip, however, the horses showed the result of an education which seemed to have outstripped that of their drivers.

On returning from this very pleasant jaunt we found that the authorities had been "mending the road" by dumping upon it a peculiar quality of yellow gravel, which possessed about as much fitness for road material as so much wheat would have done. One deep hole had been filled with it, and not properly realizing the situation I tried to "rush" it. I felt my rear wheels sink into it up to the hubs, and no application of the lowest speed was equal to our extrication. However, with a friendly push from several of the "road menders" we were fortunate enough to reach solid footing once more. We reached home with one of the single tube front tires in a state of collapse.

A few days after I had my first experience with difficulties arising from too much oil. The man who had put the oil in the engine crank case had been altogether too liberal. I started out in ignorance of this fact, but very soon the engine stopped in the midst of clouds of oil smoke, and I had the unpleasant duty of drawing off the oil through the rather inaccessible plug, and then of removing and cleaning the spark plugs, in order to get running again.

VIBRATORS.

The vibrators of my spark coils have proved a prolific source of annoyance, and I believe that this piece of apparatus must be eliminated from the motor carriage of the future. The contacts of the vibrators were too small and of too soft metal to maintain a good electrical condition for any length of time.

MUD TROUBLES.

Several times I have had occasion to use the carriage under very muddy road conditions. One day particularly I began to realize how little the ordinary motor vehicle is protected from the evil effects of a wet road. In passing through a deep puddle, at good speed, my engine suddenly stopped short. I instantly divined the cause, and, taking out my handkerchief, wiped off the porcelains of both plugs, which had become short circuited by the muddy water from the road. The engine then started readily, although it was not pleasant standing in a puddle to do the cranking.

During the same trip one cylinder suddenly ceased work, and the sound of the suction indicated an inlet valve difficulty. The mud had collected upon one of the inlet valve stems, thus holding it open against the spring. Before I had returned from this mud bath my steering gear was so filled with dirt as to operate with great difficulty. It is apparent to me that little regard is paid to the exigencies of muddy weather use, on the part of automobile manufacturers. It is all well enough to hang a vehicle engine close to the ground, if it be well protected from splashing, but when one remembers that a single splash of mud upon the spark plug may put the vehicle out of commission one is convinced of the necessity of such protection.

When the automobile actually begins to become a vehicle of utility some proper consideration must be given practical matters like these.

The Item of Repairs.

By Dr. Daniel Longaker.

A glance at the figures in my article on "The Item of Cost" shows the amount spent for repairs in two years to be almost equal to the original cost of the carriage.

Here several pertinent questions may profitably be put and answered: What was the manner of driving as to speed? What was the character of the roads and what special points of weakness developed?

The greater half of the driving was on our well paved urban and suburban streets. Next to this was driving on a route directly west, toward Reading, over roads not good and quite hilly. One of these hills, approximately a 10 per cent. grade, is a mile long. This was the route to the parental home, and the trip was made almost weekly during the two summers. The distance, round trip, is 80 miles. Our time was three hours going and three hours coming, an average of a little over 13 miles an hour. In the earlier trips the brunt of wear always fell on the engine and change speed gear or transmission. Later, with improved lubricating devices, it was different. The early trips were, as a rule, followed by a visit to the repair man. In the very last one there was a gasoline consumption of only 4 gallons, and in every way perfect behavior of the engine. In early trips to the same points frequently twice this amount of fuel was used.

The city driving was particularly hard on the springs and under frame. The behavior of the engine never caused me the slightest concern or uncertainty, and could the same be said of the rest of the outfit there would not be the slightest cause for dissatisfaction or complaint.

In spite of this I am inclined to question the wisdom of employing the engine of stationary practice for automobile driving. There is no question of its reliabiilty, its economy or its long life. In itself it need give little trouble. But this is not all—there is another side to the question, and there the disadvantages meet us. These are inherent in the great weight and the marked and unavoidable vibrations, and I am beginning to think these two features more than counterbalance all the good points. Many of these engines will, like mine, still be good when they no longer have a carriage to drive.

The great weight of the storage battery is one of the objections to the electric vehicle. Perhaps the gasoline vehicle, whose engine, heavy flywheel and cooling outfit weigh about as much as the storage battery, will likewise be a passing and transient affair. No matter how ingeniously mounted the dead weight is there, and it will be subjected to vibration, and the result be disastrous.

I have repeatedly seen the claim made that every hundred pounds of weight should have an available horse power. But with the prevalent design this will only accentuate the troubles, will mean shorter life for the carriage and offer only the single advantage (?) of better speed on hills. It ought never to be forgotten that weight in itself is an objection. Like great speed, it is fatal to pneumatics. In despair a few operators have applied solid rubber tires, but the destruction wrought to axles and other parts has not promoted their general use. Development must come by lessening the load. Bad suspension of body and inadequate fastening of springs to axles are too frequent and serve to accentuate troubles incident to vibration and the shocks of the road. I have often seen carriage builders smile when called on to remedy these defects, and I have never regretted the adoption of their advice. Short springs, constantly breaking, were replaced by longer and stronger ones, and springs were bolted to axles so they could not change their position. I am convinced of the superiority of the "three point" support for the body, in favor of which The Horseless Age spoke a few weeks ago. My experience is limited to a number of drives with a friend who tours some, and who has driven a steamer many thousand miles. During the past season his "three point" support has given him the greatest satisfaction. In his carriage the reaches are retained, and I am inclined to think their abolition in steamers is not so esential as in gasoline vehicles. The improved

running qualities due to the three point support are at once apparent. One wheel may drop into a hole or ride over an obstacle without subjecting the vehicle to an injurious strain, and the consequent easy riding surpasses anything I have ever experienced. Manifestly this must mean little breakage, long life, few repairs.

VIBRATION.

I may here mention a breakage which serves as an object lesson of the destructive influence of vibration. My present carriage, one of the best of its type, is equipped with an expanding hub brake actuated by traction through a three-eighth inch rod to each hub. By an oversight the rod on the engine side is unsupported by a brace, while the one on the opposite side is firmly held. Twice the unsupported rod has broken off near its middle—not while used to apply the brake but while going on the level. The other one has never given the slightest trouble.

One may stand by the side of the machine when the engine is running and throttled and note every impulse. The rod swings up and down with a quick motion. A brace or two will hold it in place and probably prevent trouble in the future. Breakage of the front spring on the engine side is likewise significant. The impulse of every stroke of the 5x7 engine is transmitted to the carriage; the nearest spring and the one that supports the greater weight is most affected. One can readily see that such vibration would show destructive effects, even though the carriage stood still. If the engine ran long enough a time would arrive when the carriage would break in some part. The stronger the engine the shorter the time.

Improved design, good workmanship and better material are necesary in order that expense of repairs may be minimized. By good designs are meant the utmost simplification, the abolition of unnecessary parts, adequate size and strength of all parts, and, perhaps most important of all, the appropriate placing of the engine. The placing of the engine should be determined with reference to accessibility and the attainment of a minimum of vibration. Vibration of the engine transmitted to the carriage and of jolts transmitted by the carriage to the motor are both to be avoided as far as may be.

ACCESSIBILITY.

I am sure all of us have wasted much time and spent many dollars in removing bodies, under which are placed motors and their accessories, often in order to make the smallest replacement or repair. The work of getting the top and body off and on may cost more than the repair itself. This is true even of the latest models, the piano box buggy like affairs that run everywhere. It was eminently true of my first vehicle, but as it would consume too much time I will cite but a single instance which will serve to show the costliness of this feature of poor design when repairs *become necessary. An unreliable* chain adjustment caused the chain to climb the sprocket and become jammed. The sudden stoppage caused a gear to strip. The important item in the cost of this repair job was the time consumed in getting the locked mechanism released. It took the machinist just six hours, and it cost $3.60 to do this.

The abolition of countershafts in the change speed gear is one of the best proofs of the advent of simpler mechanisms. With this goes the direct drive on the full speed. Given a throttled and governed engine, one can operate 95 per cent. of the time without the turning of a gear and minus the consequent grind of cogs. This means economy of power, lessening of wear and quiet operation.

I believe correct design implies placing the engine in front under a bonnet or behind the body and not under it.

I have already spoken of the great reliability of the heavy, slow speed engine, also of its objectionable vibration and weight, and while it is true that it is ordinarily long lived, it is also true that it is subject to accidents that are often costly. Broken shafts, broken connecting rods, broken pistons and loose flywheels afford strong proof that after all and *per se* it is not so suitable as it appears on first thought. Add these to the objectionable weight and vibration and the case against this type of motor is strong. My own feeling is growing against it. Twice have I broken a shaft, once a piston, and I am cognizant of a number of similar accidents. I do not know whether the high speed small engine is likewise subject to similar breakdowns, but I have not heard of any. The broken piston occurred on my first wagon in my early experience, but the broken shafts on the second one after I had acquired much experience. It is but fair to add that the latter were replaced by the maker without charge.

THE REAR AXLE.

The rear axle construction perhaps represents the weakest point of all. Tubular sleeves with a live axle turning on so called roller bearings may be justly looked on with suspicion. These hardened rollers turning inside of a soft iron tube are about as appropriate as a pair of linen cuffs on the arms of a blacksmith. Imagine my chagrin when, having pointed out this defect to one of our pioneers, my criticism was met with the remark: "Perhaps, doctor, you did not oil it enough." Let us hope that this weak point will soon be eradicated by better workmanship, material and design. My present carriage has a forged steel, one piece rear axle and no roller or ball bearings. However, many continue to be differently constructed.

In the past many of us have been too easily satisfied, and the machines have in consequence been crude and costly. Moreover, automobiles, like every other article of manufacture, are built for profit. But most unfortunate, from my standpoint, m· · · e best engineering talent of the clusively interested in developing the Ghosts and Devils of colors and hues. The wants of wh at this time appear to them as sm receive little consideration. But upon it, Devils and Ghosts are a fad, and the class that today toys wit will tomorrow adopt something nev haps the dirigible balloon.

Meanwhile, 100,000 doctors ir land await the advent of a goc economical motor carriage. And needs will constitute not a passing lasting demand. They are willing $500, $600 or $1,000 for such a carria they are not willing to spend an amount for repairs in the brief sp two years.

Finally, I am not surprised at cost of operating of over 21 cents Considering all things—mileage, speed, vehicle and inexperience of t erator at the outset—it is a perfo one need not be altogether ashamed

What would it cost to make th mileage with horses in the same The correspondent's query is to th and I would reply: It has been sul to a horseman of some experien judgment, and his answer is interes is: "Just as much." This ought to some satisfaction to those gentlem object to the divulging of figur those in "The Item of Cost."

BEGINNERS PAGE.

The Fuel Feed, Vaporizing Control System.

(Concluded.)

VAPOR GENERATORS.

The torch method of starting t may have the advantages of safe simplicity, but it lacks that of conv The situation is rather embarrassi instance, if on a stormy day the fire blow out on the road somewhere open country. This shortcoming w ognized soon after the first steam c were placed in use and a number o generators were invented and placed market for attachment to steam c to dispense with the torch. Fig. 1 i lustration of one of these generator ing an outside view. When this ge is fitted to a burner the gasoline through a pipe across the com chamber and arrives in the generato union A. The generator consists o tangular box in which are arranged light and vertical cast iron plate wi connecting the gasoline admission, tomatic regulating valve passage, t light nozzle and the main burner The automatic fuel regulator scre the generator at B, there being a through the vaporizing plate from C is the main burner nozzle which into the mixer tube. The passage

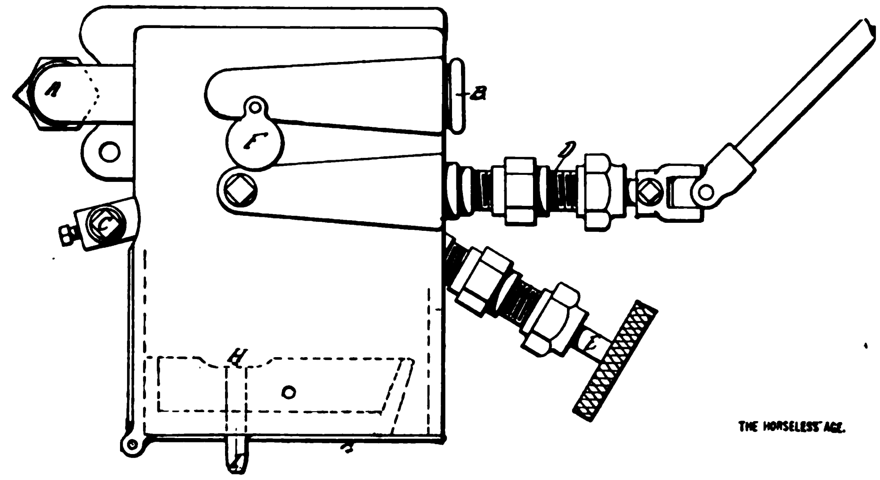


FIG. 1. VAPOR GENERATOR AND PILOT LIGHT.

nozzle is controlled by the automatic fuel regulator and also by the valve D, which is operated from the seat and furnishes what is known as "seat control of the gasoline." E is a valve for adjusting the gasoline feed to the pilot light within the generator. The pilot light is of the Bunsen type, consisting of a gasoline nozzle surrounded by an air induction tube. F is a shutter for an opening in the generator casing, through which the pilot light flame can be observed.

At the bottom of the generator case there is a hinged door G, in the form of a trough. One of the top edges of this trough is cut away for part of its length, as indicated at H, and at this part there is a vertical groove in the wall of the trough on the outside ending in a drip nozzle I. To start the pilot light gasoline is allowed to flow into this trough until it runs over at H and drips from the drip nozzle I. A lighted match is then applied to the gasoline dripping from the nozzle, and the flame instantly travels upward and ignites the gasoline in the trough. This heats the vaporizing plate, and when the gasoline in the trough has been nearly consumed the valve E is opened, which lights the pilot burner. The space in which the pilot light burns is in communication with the combustion chamber of the main burner, through a passage in the wall of this chamber, and the flame of the pilot light extends into the main combustion chamber so as to light the main burner when the fuel is turned on, and to relight it after it has been extinguished through the action of the automatic fuel regulator.

Burning gasoline in the trough under the generator develops smoke, and to avoid this the door can be let down and an alcohol lamp be hung under the generator, on the pin J. When the vaporizing casting is sufficiently heated and the pilot light started the alcohol burner is taken off and the door closed. In ordinary use an alcohol lamp is used when starting from the stable, and the trough and gasoline when the burner is to be started away from the stable.

THE PILOT LIGHT.

Most of the later designs of steam carriages are provided with a pilot light as a regular attachment to the burner, which serves the object of starting the main burner, keeping up steam pressure when the carriage is standing, and relighting the main burner whenever the gasoline vapor is turned on again. These pilot lights are generally made on the same principle as the well known plumber's torch, and Fig. 2 shows a typical construction. This pilot light is placed in a cylindrical opening in the main burner (as shown in Fig. 2 in the article on "Burners," issue of October 1), and is connected to the gasoline supply in such manner that the gasoline flowing to it does not flow through the automatic regulator.

Referring to the figure, A is the pipe through which the gasoline arrives, B a curved auxiliary vaporizing tube, and C the body of the pilot light. D is a horizontally arranged needle valve, which is opened and closed when the fire is to be started and stopped respectively, and E a vertically arranged needle valve for the minute adjustment of the vapor nozzle. To the lower part of the body casting is affixed the cup F, and the upper part is closed by a perforated cap G.

By opening the valve D, in starting, liquid gasoline is allowed to flow into the cup until it is nearly filled. The valve is then closed again, and the gasoline in the cup ignited with a match. The flame from the cup rapidly heats the bent auxiliary vaporizer, and when it has nearly died out the valve D is opened again, and vapor will then issue from the nozzle, and will burn at the perforations of the cap G,

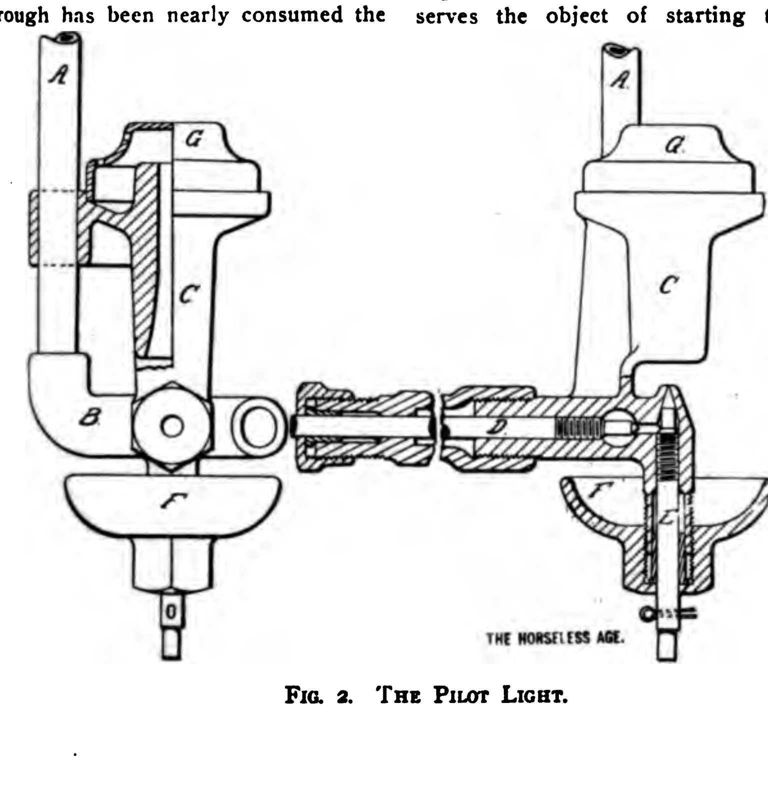


FIG. 2. THE PILOT LIGHT.

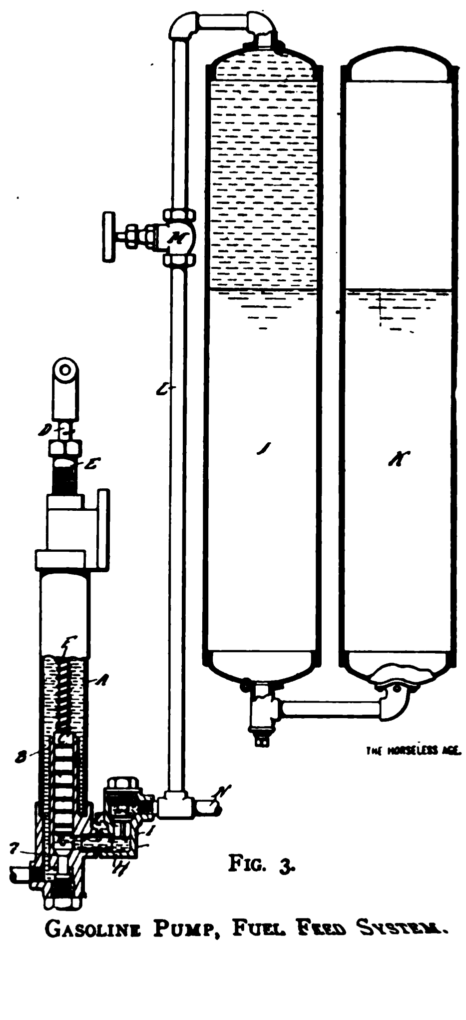


FIG. 3.

GASOLINE PUMP, FUEL FEED SYSTEM.

constituting a Bunsen flame. The pilot light always burns at full blast, and is therefore less likely to be blown out than a main burner turned down so as to just keep burning.

GASOLINE PUMPS.

To have the complete supply of gasoline under air pressure has some disadvantages. Every time the gasoline tank is filled this tank full of compressed air is wasted, which amounts to a certain loss of power. The air in the air pressure tank becomes charged with gasoline vapor, forming an explosive mixture under pressure, which involves an element of danger. To overcome these difficulties a number of fuel feeding systems have been devised in which gasoline is pumped instead of air, and in which only a small part of the gasoline supply is kept under air pressure at any particular time. Fig. 3 illustrates one of these systems.

In the illustration A is a tubular chamber, which is in communication with the gasoline tank. Within this chamber is located a pump cylinder B containing a plunger C. The plunger rod D extends through a stuffing box E on top of the cylindrical chamber, and terminates in a fork, through which operating connection is made to the engine. The plunger is lifted by engine power and depressed by a spring F, and the pressure of this spring determines the pressure under which the fuel is fed. Below the plunger is shown the suction valve G, and in the valve box H, adjacent to the cylindrical chamber, the discharge valve I. The system further comprises two vertical cylindrical tanks J and K, communicating with each other at the bottom. The lower part of both of these tanks contains water. The upper part of the tank K contains air under pressure and the upper part of the tank J gasoline. The upper part of the tank J is in communication with the discharge of the gasoline pump through the pipe L, in which there is a globe valve M. N is the burner feed pipe. Owing to the water in the cylinders the gasoline never comes in contact with the compressed air. Gasoline is an absorbent of air, and if there was no water in the cylinders all the air would soon be absorbed and pass out with the gasoline. With the water this trouble is entirely avoided. When it is desired to make any repairs to the pump or gasoline piping the valve M is closed, and thus the air pressure in the tanks preserved.

When gasoline is being pumped great care must be taken that none of it leaks out of the apparatus, as this would be dangerous. As in this apparatus the pump cylinder is located entirely within a vessel in communication with the gasoline tank, any gasoline which may leak past the pump plunger remains in the tank. Only a small part of the gasoline carried is under pressure at any one time, and the fuel pressure is more nearly constant than with the old system.

..COMMUNICATIONS..

Automobile Boilers.

Editor HORSELESS AGE:

Will you kindly advise me through your paper as to whether a flash boiler or a water tube boiler would be the most suitable for a small steam carriage? I have your Steam Boiler Number, in which I was much interested. I do not see any of the carriages but what have the usual shell boiler. Being a recent subscriber to your paper I have not kept pace, but I believe automobiles are just in their infancy, and will be greatly improved in the future. Kindly advise me in regard to the above points, and also whether there are any books on boilers for automobiles.

GEO. E. LUCAS.

[Opinion is not unanimous as to what type of boiler is best suited to steam automobiles. Fire tube boilers are at present used in the greatest number, water tube boilers coming next and flash boilers last. That the latter are not used by more manufacturers is undoubtedly due to the fact that the various successful constructions of flash boilers, and especially their regulating systems which are an important feature, are covered by patents. All the different types of boilers have just been described in our "Beginners' Page," and their respective advantages and disadvantages pointed out. We know of no book dealing specially with automobile boilers.—ED.]

Spring Suspension Queries.

Editor HORSELESS AGE:

Will you please answer the following questions in your paper? I have a 4½x6 inch single cylinder air cooled gasoline engine hung on the frame of a wagon. The body is suspended on three 1¼x36 inch three leaf elliptic springs. Will the same number of 1½x36 inch four leaf springs be strong enough to hold the engine and body?

Also, my sprockets have ten and thirty-six teeth and are 20 inches between centres. If I put the engine in the body the driving sprocket will be about 8 inches higher than the driven sprocket. Will the chain loosen up too much by the springs compressing without using distance rods? If I use distance rods, how can the body move forward, as the springs compress? It seems as though it would have to.

CONSTANT READER.

[You can learn from the spring manufacturers how much more weight the four leaf spring is intended to carry than the three leaf spring, and by weighing your engine and transmission gear see whether the extra carrying capacity is equal to this extra weight. A distance rod is necessary for the sake of safety. The relative proportions of distance between centres of sprockets and the vertical height of one sprocket over the other are bad. The line between the sprocket centres should be more nearly horizontal. With the dimensions you give the springs must have a swivel joint with the body to allow the latter to move forward when the springs compress.—ED.]

Explosive Engine Queries.

CHICAGO, October 13, 1902.

Editor HORSELESS AGE:

Will you please advise me through THE HORSELESS AGE what are considered the advantages and disadvantages as compared with each other of (1) a double cylinder motor, with a single carburetor, and one with a carburetor for each cylinder; (2) a double cylinder motor, with the exhaust pipes joined leading to a single muffler, and one with a separate exhaust pipe and muffler for each cylinder? H. M.

[A single carburetor is almost universally used with multiple cylinder engines. The advantage of this practice is greater simplicity, with equal results under normal operating conditions. Only in case the two inlet valves are located far apart, as, for instance, in opposite cylinder engines, and the carburetor construction is very simple, would double carburetors be at all advisable.

It is the same as regards mufflers. A single muffler is simpler and equally efficient, but it may sometimes be more convenient to put one muffler near each exhaust valve and thus reduce the length of piping required.—ED.]

Editor HORSELESS AGE:

How much more power (if any) should a 4 horse power Oldsmobile engine develop, if a valve was put in that could be opened and closed at pleasure, between the compression chamber and muffler, so that the burned gases might escape without passing through the muffler? In other words how much power does the muffler absorb? L. T. BROWNE.

[We do not know; if any of our readers have experimental data on this subject they will do us a favor by communicating same.—ED.]

Anti-Freeze Solution—Notes of Experience.

Editor HORSELESS AGE:

Some time ago you published a receipt for an "anti-freezing mixture" to keep the cooling water from freezing in a gasoline vehicle. As cold weather is approaching, will you kindly republish this?

Will this chemical mixture be apt to form a sediment which will tend to clog the pipes?

I consider the "Practical Experience Department" of your paper its most valuable feature, but the value of any article is detracted from where the name of the vehicle is not given. If any make of machine shows up well under the trying condi-

tions of a tour, let us know the name of it. If practical usage shows defects, let us know the name of the machine, so that the user can remedy same and the manufacturer take a tumble to the weak points of his vehicle, for all of them have their weak points as well as good ones.

I have used a standard gasoline machine since last April. I have run it on 100 mile tours over some of the roughest and hilliest roads in the States of Missouri and Kansas, and I believe the machine will go any place that a team of horses can pull a wagon. Wet, slippery roads were the one condition which the machine could not surmount.

SLIPPERY HILLS.

Leaving Excelsior Springs, Mo., one morning at 9 o'clock, immediately following a heavy rain storm, I was four hours in going 12 miles, having frequently to build a sort of corduroy road with brush and branches of trees in order to give the driving wheels a hold to get up some sharp inclines or slippery muddy hills. In striking one of these bad places the machine would develop plenty of power, but the driving wheels would simply fly around in the mud. Wrapping the wheels with rope did but little good, and would simply result in the wheels tearing up a little more dirt.

Outside of the breaking of a minor spring or the loss of a nut these cross country tours have been made with but little trouble.

In going up one rocky hill, however, the outside covering of one of my single tube tires was torn completely into shreds. The inside fabric of the tire held good, and I made the balance of the trip of 50 miles without the loss of air from the tire. The company promptly recovered the tire without extra charge.

One constant source of annoyance in my machine has been the frequent jumping off of the pump chain. The chain will run well after adjustment for a few days, but invariably after a short spell of good behavior jumps off and is the cause of dirty, greasy hands and a few cuss words.

I have had my share of troubles in operating my machine, and expense also, but the pleasure derived from the use of the machine is well worth it. Some of my troubles have been caused by defects in the machine and others from the wear and tear of rough usage.

I deem it no more than right to say that if every manufacturer is as attentive and liberal in the treatment of the owners of their machines as the manufacturers of my machine the troubles incident to owning a motor are greatly minimized. Every breakage which has occurred due to defect of the machine has promptly been made good by the maker, and every order for repairs and requests for advice is given prompt attention.

In an industry like the manufacturing of the automobile, which is as yet, one might say, in an experimental state, a liberal and helping spirit should be shown by the manufacturer to the purchaser.

D. R. ANTHONY, JR.

[The anti-freeze solution is a solution of calcium chloride, of which 5 pounds are dissolved in 1 gallon of water. There is no danger of clogging the pipes with this salt if pure water is added for that evaporated.—ED.]

Comparative Thermal Efficiency of Kerosene and Gasoline.

Editor HORSELESS AGE:

Will you kindly explain upon what the thermal superiority of kerosene depends? Does kerosene in vaporizing expand into a larger volume of vapor than gasoline, or does a certain volume of kerosene vapor at given temperature contain more heat units than gasoline vapor at the same temperature or state of superheat?

JOE SINGER.

[Weight for weight kerosene is slightly inferior to gasoline as regards calorific power. Both kerosene and gasoline are composed of carbon and hydrogen, and gasoline contains a greater proportion of hydrogen, which has the greater calorific power. Kerosene is only superior if a comparison is made on the basis of price; i. e., a dollar's worth of kerosene gives out much more heat than a dollar's worth of gasoline at present prices. The whole question was fully treated in our kerosene number.—ED.]

Have Meritorious Devices Been Condemned?

Editor HORSELESS AGE:

Having been a reader of your valuable paper for some time, and having closely followed the development of the motor carriage, I sometimes think that in the evolution of the same some really good things have been condemned. Among others, the belt drive, which under proper conditions I think is as good, if not better, than chains or gears. Take a medium weight and speed carriage with engine in front, so as to use a long belt with pulleys large enough to give high belt speed, and I doubt if anything has been found which is as easy on both engine and carriage. I find from experience that the belt gives very little trouble. Give the belt proper speed, and do not expect it to do more on a carriage than in the shop, and I believe it will prove one of the best means of transmission.

Further, I believe that the air cooled engine has been discarded in a great many cases because it has not been properly designed and built. I am aware of its limitation, but for light weight and speed carriages for pleasure purposes only the air cooled engine will do the work. I am now running a $4\frac{1}{2}$x$4\frac{1}{2}$ air cooled engine, driving a carriage weighing 1,000 pounds, which gives no trouble whatever, and is, I believe, perfectly adapted for such carriages. Anyone having had experience with water cooled engines knows of the trouble with pumps and leaking pipes, to say nothing of the trouble in cold weather from freezing, etc.

I might speak of the sparking coil without the troublesome vibrator, which is fast being given up; and still, I think, the old coil without the vibrator will, under proper conditions, give the best satisfaction and far less trouble.

F. P. GREENE.

Effect of Altitude Upon Gasoline Motor Power.

Editor HORSELESS AGE:

In a recent issue of THE HORSELESS AGE an editorial dealing with the effect of altitude upon the power of gasoline motors sets us fellows who are away from sea level and well up in the air to thinking several things. Among these is that the editor, when he wrote it, did not have in mind some of our prosperous cities 'way above sea level, where automobiling is a pleasure the whole year round and most of the roads are ideal for this sport.

On this account we do need to concern ourselves about this undeniable shortage of power in the gasoline motor at these altitudes and search for a remedy. While it is perfectly true that increasing the size of intake valves and piping above what is proper at sea level will avail nothing, it is equally true that a motor which shows a certain compression at sea level will not, if carried up to a higher altitude, show as high a compression, and this loss of compression will increase with the height above sea level to which it is carried. This is exactly equivalent, as far as results are concerned, to a loss of compression in this same motor at sea level, by leaky valves or rings, under which conditions it would develop correspondingly less power. The cause of this is obvious. Since the piston displacement is constant, a full charge of rarefied air, when compressed, will not register as high a gauge pressure as would air of greater density. The remedy for this loss of power should be equally obvious, and was provided by the writer nearly five years ago in a motor built by him at that time for experimental purposes, and which is doing regular daily work today. In this machine the clearance space was cut down very considerably below that calculated for sea level conditions, with a marked increase in power, and provided it was not carried far enough to cause premature ignition or bring undue pressure upon bearings, would be found to have no offsetting disadvantages. This has since been tried upon a number of automobile motors in this section of country by the writer, and with gratifying results. These were machines which were manufactured in the East and Middle West at practically sea level. The writer has knowledge of a large gasoline touring car of standard make, recently sold to a party in Leadville, and as that city is nearly 10,000 feet above sea level, it would look as though this pur-

chaser must needs concern himself quite a little regarding this loss of power question.

JUMP SPARK IGNITION WITHOUT TREMBLER.

In the same issue there appears an editorial relative to Mr. Bramwell's idea of substituting the alternating current for the mechanically interrupted direct current in jump spark ignition. This discussion leads some of us to wonder why a "trembler," with its annoyances, is required at all. It is a positive fact that a mixture which will ignite properly with a stream of sparks will ignite equally as well with one solitary spark of as great intensity as the first spark of this stream, and a saving in battery consumption and freedom from the many troubles with the vibrator will result. The changes in adjustment, which will seriously interfere with the successful operation of a vibrator coil, are so infinitesimal that the mere warping of the wooden end of the coil box, as brought about by extremes in temperature or humidity, will at times cause the coil to absolutely refuse to operate, since the vibrator and its supports are fastened to this end. In electric ignition, since the spark ignites the mass of mixture immediately surrounding it first, and the resultant flame must be propagated throughout the entire mass before complete ignition takes place, it would seem as though several sparks occurring simultaneously at different points in the explosion chamber would be much more effective than anything yet devised, especially in high speed motors. This thought came to the writer over a year ago and is the foundation of experiments being carried out at the present time. W. O. ANTHONY.

They Want Too Much.

Editor HORSELESS AGE:

The letter of T. Haines Moore in THE HORSELESS AGE of October 8 sizes the situation up in a way that strikes me very forcibly. Our company is looking for men like him as customers. Some people want their auto to climb an apple tree and pick the apples, and then kick if the machine does not sort the apples.

FRANK MCPHILLIPS.

Proportion of Power of Two and Four Cycle Engines.

Editor HORSELESS AGE:

Will you kindly inform me what is the comparative (brake) horse power of a four cycle and a two cycle engine, the latter of the familiar compress-in-the-crank-chamber type? Of course, I mean at the same number of revolutions.

I find a somewhat wide difference of opinion—all the way from 4 cycle:2 cycle:: 7:6 to 4 cycle:2 cycle::5:9.

MILES G. NIXON.

[No such general comparison as you ask for is possible, for the reason that the most advantageous speeds are greatly different with engines of the four and two cycle types with cylinders of the same dimensions. To illustrate: a 4½x4½ inch four cycle engine may give its greatest power at 1,000 revolutions per minute. A two cycle engine of the same dimensions would give its greatest power at a much lower speed. The latter may be able to run at 1,000 revolutions per minute, but would then probably give no power at all. On the other hand, the two cycle engine may give its greatest power at 500 revolutions, and as at that speed the four cycle would develop considerably below its normal power the two cycle would probably be more powerful at this speed. The proportion varies thus with the speed.

A more rational comparison would be that of the maximum power obtainable from cylinders of given dimensions on the two and four cycle plan. Little seems to have been done to develop a high speed two cycle engine. It would, of course, be an injustice to the two cycle engine to compare the slow speed two cycle launch motor with the high speed four cycle motors of the De Dion and Buchet types. The latter develop about twice as much power as has been obtained from a two cycle motor of the same dimensions, according to the claims of the respective manufacturers.—ED.]

Some Shadows in This Picture.

Editor HORSELESS AGE:

An automobile is not only an attractive but a very interesting machine, and many of the advertisements are extremely fascinating and alluring. The uninitiated might be led to believe that all that is required is to sit on the seat, move a lever, and away she goes, up any hill, through any amount of mud, or sand, that all roads are alike, that it is a simple proposition, and "a child can run it," all at a cost of less than 2 cents a mile, etc. Nothing could be more misleading and such advertisements are false. I purchased a machine with a similar ad., describing the roads over which I wished to run, and was assured I could do so with little or no trouble. After becoming familiar with the machine around home I undertook a trip of 45 miles, my wife accompanying me, and let me say right here but for her and my early education there would still be echoes of profanity along that road. The machine was advertised to weigh less than 600 pounds, and strong enough to carry a ton. To my great surprise I found that it weighed 860 pounds instead, and yet the frame broke under the immense strain of two persons of medium weight. The slender speed wire broke. The spiral connection to the circulating pump broke, allowing the water to become overheated. The rubber gasket gave out and water leaked into the cylinder. The utterly worthless gears stripped while ascending a hill on my return after making the other repairs, and left me again, and yet no outward profanity. I have had all of these radical defects repaired, and occasionally make short trips, feeling quite confident of reaching home the same day, and without a rope, although there are many other things to annoy—ignition plug, gasoline flow, muffler, tires, etc. These troubles are all liable to and do occur with the most expert driver. The machine was carefully handled, well oiled, and in no single instance will I shoulder the blame. My advice to would be purchasers is to think twice before purchasing, look into the matter most thoroughly. Read THE HORSELESS AGE and get posted. Try and get if possible as much of a guarantee with a horseless wagon, representing hundreds of dollars, as you would were you to purchase a cheap horse wagon, costing $50 to $100. Out of it all there is fun to be had, and I am getting my share.

E. BARTON WHITNEY.

Renault Used De Dion Motors in Paris-Vienna Race.

BOSTON, October 18.

Editor HORSELESS AGE:

I have just noticed an article in your edition of October 8 stating that until the present year the Renault brothers in their voiturettes used the De Dion motors, but the machine which was first in the Paris-Vienna race was equipped with a four cylinder motor of their own construction.

Now I am positive that this is not so. I had heard shortly after the Paris-Vienna race that they had used De Dion motors, but, not being sure of the fact, I decided to wait until I arrived in Paris and make sure before I advertised that they used De Dion motors. Immediately on my arrival at the De Dion manufactory I asked the director of the De Dion-Bouton Company. "Yes," said he, "we made all the parts, cylinders, pistons, etc., but the Renault brothers assembled them. We are making all the parts for their two cylinder motors as well. We do not assemble them simply because we have not started yet to manufacture two and four cylinder motors."

Now, on the strength of this I returned and advertised that the winner of the Paris-Vienna race used De Dion motors, and if you can prove to me that my assertion is not correct I am willing to acknowledge my error; otherwise I ask you to correct your statement in your first issue, as it leads the public to think I am not truthful in my statements.

KENNETH A. SKINNER.

Ignition Queries.

Editor HORSELESS AGE:

I have a double cylinder opposed type gasoline motor, 4x4 inches, which I wish to equip with jump spark ignition. I have decided to use a vibrator on the coil, and wish to know if this is practical and possible with only one coil without using some commutating or passing over device.

I was figuring on inserting two copper sectors in my circuit closing device, and as

the resistance is greater in the cylinder where the gas is compressed than in the other, the loss of current would be unimportant. Would you kindly enlighten me on this subject and show a diagram how to wire it up? R. T. SIMS.

[The plan you suggest is impractical, as you would get the most intense spark in the combustion chamber, where there is no compression, where you don't want it. For a simple method for igniting two cylinders with a single coil with buzzer see THE HORSELESS AGE of June 19, 1901, page 204.—ED.]

Concerning Expense and Use of the Automobile in Winter.

Editor HORSELESS AGE:

I have been using an auto in my practice about two and one-half years. Nearly two years ago I sold my last horse and have been attending to all of my visiting in the automobile. To offset Dr. Longaker's depressing communication I wish to give some figures to quiet Dr. Schoop's fears and help lift the cloud hanging over the heads of prospective users of the motor car. I cannot pretend to emulate the 14,000 miles with "little or no trouble" that Mr. White announces to us, because, if I had been driving over the Golden Streets, the iron and steel of the motive power and frame would have crystallized and the tires been a thing of remembrance only. But I can affirm that I have run my present machine eighteen months, attending to all of my practice every day during the entire time, winter and summer, and, in addition, making long runs into the country with three companions when occasion permitted. During the past winter, while for six weeks the thermometer hovered about zero, Fahrenheit, my machine was in daily use.

As I have used a horse and buggy for many years. I am thoroughly acquainted with the expense of this mode of conveyance:

Horse feed, shoeing, repairs on harness and buggy for eighteen months	$375.00
Interest on $400 (cost of horse and buggy) at 5 per cent., eighteen months	30.00
Total	$405.00

My present 12 horse power gasoline auto has cost for eighteen months:

New chain	$10.00
New crank shaft (old one crystallized	10.00
Repairs for three skidding experiences and putting in new crank shaft	59.35
Repairs on three tires	8.00
Gasoline, lubricating and cylinder oil	40.00
New batteries	15.00
Interest on $1,500 (cost of auto) for eighteen months at 5 per cent.	112.50
Total	$254.85

Amount saved by use of automobile for eighteen months	$150.15

Which is about 7½ per cent. made on my investment.

Skidding is the toughest proposition I have encountered in the use of the automobile and one I am least able to cope with. There has been much written in your valuable weekly by friend Charles Duryea and others, but one feels impressed when reading these articles that a lot of theory has been put on paper and that the writer has not been "up against the real thing." Most of my gyrations have been caused by swinging out of a car track on a greasy roadway. It is no trick at all to make a complete rotation.

WINTER TROUBLES.

With certain changes a gasoline machine can be used every day all winter and give most excellent service. Most of the constant level vaporizers have the float so placed that the level of the gasoline reaches very nearly the spraying openings, so that a very little suction gives an abundance of gasoline. This gives very excellent results in warm weather, but when the temperature is much below the freezing point only a small portion is vaporized, giving a very weak mixture, and the balance is burned in the cylinder as liquid gasoline, causing a red hot exhaust pipe and a dense cloud of black smoke from the muffler.

I have been using the automobile through two winters and have had the same problems to solve with two machines, both gasoline, with the constant level vaporizer, and the remedy in each case was to lessen the heighth of the gasoline level in the constant level chamber. I have found in each case that adjusting the level half an inch lower stopped the trouble. In addition to this, in my present machine, in which the air inlet is near the exhaust pipe, I put a long loose sleeve, lined with wire gauze of small mesh, around the exhaust pipe, connecting this with the vaporizer, so that after a few explosions the entering air was hot enough to make the vaporizing chamber hot also. After the first freezing day my colored man and I cranked my machine for half an hour without getting an explosion. To remedy this I added a priming cup to the combustion chamber, and the engine would thereafter start with one or two revolutions. I would advise that the priming cup and plug be made of tool steel to prevent erosion by the hot gases that will in a few days cut a pathway alongside of the plug if the cup be made of brass.

Another difficulty encountered was lubrication of cylinder and various bearings. When the temperature gets anywhere near zero, lubricating oil gets the consistency of vaseline and cylinder oil becomes like wax. By adding equal parts of coal oil to each of these oils, heating and thoroughly mixing, their fluidity becomes permanent at zero.

Five pounds of calcium chloride ($CaCl_2$) was added to each gallon of circulating water to prevent freezing. I found this solution would change red litmus paper blue and blue paper red, and wherever the fluid would splash out on top of my copper water tank, erosion would take place, dissolving the thin layer of copper oxide of the surface, leaving an eroded surface when wiped off with a wet rag. It is also very destructive to solder, probably owing to electrolytic action.

"Stove" gasoline runs from 68° to 72°, and at zero gives very poor results. At this temperature only 76° should be used, although it does not give quite the power that the heavier oil furnishes.

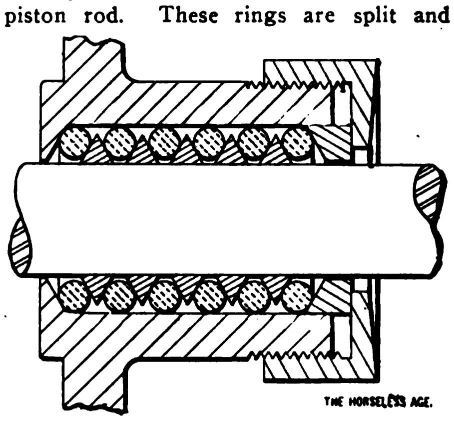
DR. SENSENEY.

A Stuffing Box for Double Acting Gasoline Engines.

Editor HORSELESS AGE:

The accompanying cut and description of a stuffing box for a double acting gasoline engine may be of interest to some builders:

The stuffing box proper may be cast integral with the head or separate and screwed in. It is considerably longer than ordinarily used on steam engines. Five rings of cast iron are turned up with triangular cross sections, and with the bore slightly smaller than the diameter of the piston rod. These rings are split and



slipped over the rod. Between each ring is packed a piece of rope asbestos. The usual jam ring and lock nut are used. When this is screwed up the triangular shaped rings tend to force the asbestos packing against the outer walls of the stuffing box, thereby keeping the piston rod tight. This method of packing has been used with success on engines of considerable size. It is only necessary to keep the rod well lubricated to insure against leakage and heating. G. S. H.

Improved Traffic Regulations Needed.

Editor HORSELESS AGE:

An occurrence of which I was an eye witness this morning has impressed upon me the necessity for intelligent action by the Legislature for the better regulation of the state of affairs arising from the advent of automobiles upon the highways.

An imported voiturette came up Fifth avenue while a grocery wagon came along

Forty-third street and across the avenue, both moving at a very moderate speed, and when they first came into sight their relative positions and speed were such that a collision was certain if neither changed speed or direction. The driver of the wagon made no attempt to avoid it that I could see. The driver of the automobile, when he did act, did the only thing that was possible, and put his steering wheel hard over, so as to swing to the west, with the result that he struck the hind wheel of the wagon. Both drivers drew in to the curb, but as the traffic was thicker on Fifth avenue than on the side street, the automobile was slower in reaching the curb, and during the interval the driver of the wagon, having dismounted and satisfied himself that his vehicle had sustained no damage, mounted again and drove rapidly away, before the other man could get near enough to him to learn the owner's name, etc.

My surmise is that neither saw the other as soon as he should have done, although it is possible that each saw the other as soon as it was possible to do so, and that each delegated to the other the duty of manœuvring, and neither acted until it was too late for a collision to be avoided.

In the case of two steamers on the high seas, in a similar position, the law prescribes that the steamer having the other on her starboard bow shall keep out of the way, and further prescribes that the failure of either vessel to stop after a collision, with a view of rendering aid if necessary, etc., shall create a presumption that a vessel failing to stop was guilty of the fault which caused the collision, which presumption is available in a civil suit for damages by the parties interested, and the law also makes the failure to stop a criminal offense punishable by fine and imprisonment.

It seems to me that somewhat similar enactments should be made with reference to traffic on the highways, and that, further, any bystander who is witness to a collision should be authorized to arrest either of the parties thereto, who should attempt to make off without stopping, etc.

VIATOR.

An Inventor's Mistake.

Editor HORSELESS AGE:

In an Eastern city not far from the Hub a worthy inventor built himself a gasoline motor. "Such a fine job and casting," etc., was his favorite description of it. On starting the motor it refused to mote. The inventor, according to his own story, must have turned the crank many thousand times in the last two years. Finally, getting disgusted, he took the motor to a specialist in motor troubles. The day after the motor was running splendidly. The worthy inventor had coupled his vaporizer onto an inlet pipe running directly into the head of the compression chamber, but had neglected to put in that very important part, an inlet valve, and accordingly never had any compression. He is not alone, however; there are others. J. C. W.

Beware of This Man.

LONDON, October 6.

Editor HORSELESS AGE:

I understand that a man representing himself as Ernest Cordingley is fraudulently introducing himself to American automobilists and newspapers as my brother. I should be glad if you would kindly make an announcement in your valued journal that I have no brother of the name of Ernest, and no relative in the United States. The alleged Ernest is an impostor. C. CORDINGLEY.

This Machine Meddler Proof—Approves Our Policy.

Editor HORSELESS AGE:

I noticed in one of your recent numbers an account of a gentleman who had his machine down at the seashore, and leaving it for repairs found that the machine was being used without his knowledge. I am using a two cylinder gas engine, and as I have occasion frequently to leave my machine on the street and in other places where I do not care to have anyone start it, I had an electrician take the switch off my dashboard and put on a Yale lock, such as is frequently used on burglar alarms and other work. It is located next to the oil can and just behind the odometer. As the lock is fastened on from the other side of the dashboard and underneath the water tank, it would be impossible for an expert even to start the machine without taking it all apart.

I read with considerable interest your recent editorial on the position your paper was taking as to the publishing of accidents and accounts of expenses, which caused some people to question whether it would be wise to buy an automobile or not, but I was very glad to see you take the broad stand that you did. It is the stand that will do automobiling the most good in the long run.

I have had my machine about six months, so I am not ready yet to say what the cost will be per mile.

CHESTER R. HOAG.

A Friend of Broad Journalism.

Editor HORSELESS AGE:

I want to enthusiastically commend the position which you assume in your issue of October 8 under the title "The Policy of THE HORSELESS AGE."

The sooner the motor car business gets down to a strictly business basis the sooner it will reap its just rewards.

The "pulling wool" policy is penny wise and pound foolish, for every time a manufacturer pulls a bunch of wool from some unsophistocated lamb it is but natural that the aforesaid lamb should become an enemy of that particular manufacturer, and more or less an enemy of the whole motor interest.

I shall continue my subscription to your paper and cancel my subscription to several others, because I believe your publication to be honest and not dominated by its advertising interests, and from the fine line of advertisements which you run I believe that the better class of manufacturers are en rapport with your policy.

P. W. A. FITZSIMMONS.

Transmission and Lubrication Queries.

Editor HORSELESS AGE:

With a sliding gear transmission in which there is a direct drive on the high gear, is it necessary when slacking speed to engage lower speeds one by one until the lowest is reached, or are the gears made to slip by when they return on the slide carriage?

Is graphite much used as a cylinder lubricant in small motors, and if so, how is it applied? W. R.

[That depends on the construction of the particular gear. With practically all gears of this sort it is necessary to pass through intermediate gears when going from the high to the low gear, but in some—the Packard, for instance, illustrated in THE HORSELESS AGE of August 20 last—the low gear can be engaged directly after the high gear.

Graphite is commonly used for cylinder lubrication and is introduced directly into the cylinder by hand, at regular intervals of time. Several graphite cylinder lubricators have been devised, but we have not yet seen them in operation on automobile engines.—ED.]

Automobile Accidents.

Nat Roe, of Patchogue, L. I., had a narrow escape at Amityville, L. I., recently. He stopped at King's repair shop for a measure or two of gasoline. King put in one measure full, but Roe thought the tank was not full enough, and some more of the fluid was poured into the tank, which overflowed. This would not have caused any trouble had not Roe taken out the spark plug. In a second the machine was ablaze. Water was thrown on the auto, which kept the tanks cool and prevented an explosion. The entire fire department was called out, but before it arrived King and Roe had extinguished the flames. The auto was badly damaged.

Owing to the sticking of a lever, as it is reported by the daily press, an automobile operated by D. Miller, of Philadelphia, became unmanageable on the Lancaster pike and was finally ditched, without injuring the occupants.

Harry Tod, a well known young man, of Youngstown, Ohio, was instantly killed and two others seriously injured through the collision of an automobile in which they were riding with an Erie express.

NEW VEHICLES AND PARTS.

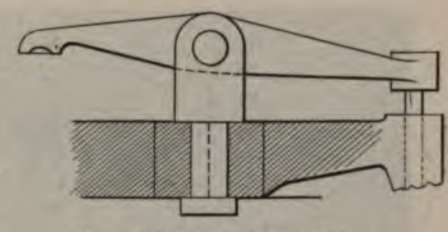
The Pan-American Touring Car.

The Pan-American Motor Company, whose factory is located at Mamaroneck, N. Y., have completed and tested some of their first machines, and have in process of manufacture a number of others. An examination of these cars shows the following characteristics:

The engine has four cylinders of the vertical type, arranged in twin form in the same vertical plane. The cylinder dimensions are: Diameter, 4½ inches; stroke, 5 inches.

The valves are one of the features of the engine. The intake valve is operated automatically by the suction of the piston, and the exhaust valve by cam, push rod and rocking lever, and the two valves are arranged concentric with each other, the intake valve within the exhaust valve. The construction is well shown by the sectional view herewith. What corresponds to the stem of the ordinary exhaust valve is here in the form of a hollow casing, which contains a spider supporting the guide for the intake valve stem. When the suction in the cylinder opens the intake valve the gaseous charge flows through the hollow stem of the exhaust valve into the cylinder. When, however, the exhaust valve is opened by means of the mechanism provided for this purpose, the burnt gases pass out of the cylinder through the free space surrounding the exhaust valve stem. Various advantages of this construction are apparent. The valve case being screwed into the head of the cylinder, the passages for both admission and exhaust are the most direct possible, and the valves, being concentric, can be made of larger size than if they were to be placed side by side in the cylinder head. The valves are held in place each by a rocking swiveled arm, capable of lateral movement to permit removal of said valves by unscrewing a single nut.

The Pan-American Gasoline Touring Car.



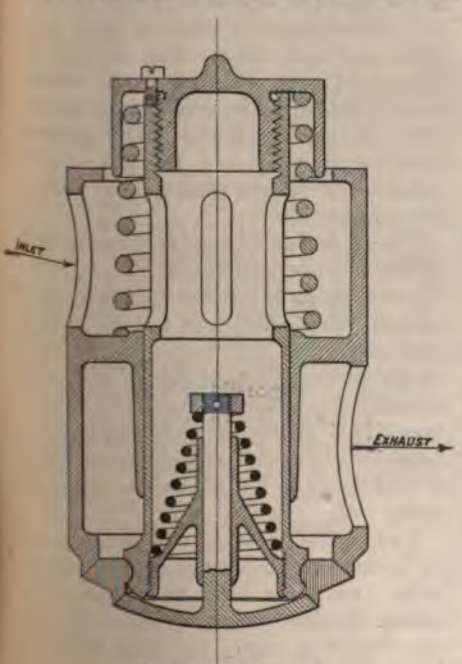
The Exhaust Valve Lever.

The exhaust valve is operated by means of a double armed lever, as shown in the accompanying cut. This lever is fulcrumed on a stud rising from the cylinder head and is actuated by a push rod guided in a bracket on the engine, making a compact and simple valve operating mechanism.

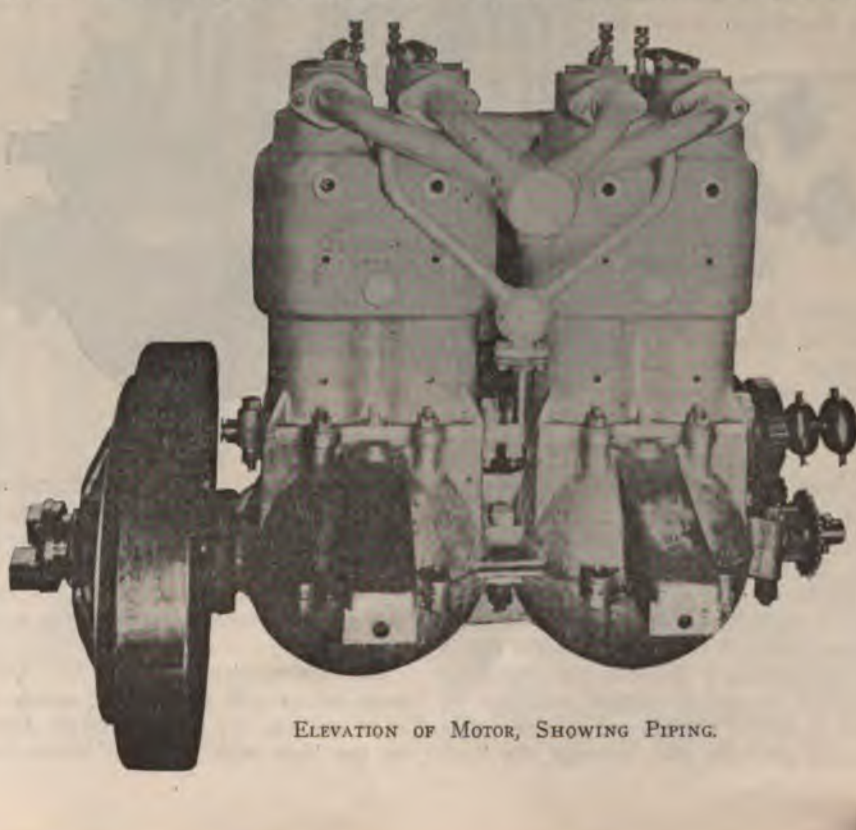
The cylinders are water jacketed, the cooling water being carried in a tank (capacity, 8 gallons) located within the chassis just forward of the rear axle. The water is circulated by a pump operated by means of a chain connecting with the crank shaft.

The fuel tank is located beneath the driver's seat and has a capacity of 16 gallons. A reservoir containing lubricating oil is placed at one side of the engine for convenience of location, and the oil is forced upwardly therefrom by water pressure derived from the circulating pump, passing to the distributers or individual feeds arranged upon the dashboard.

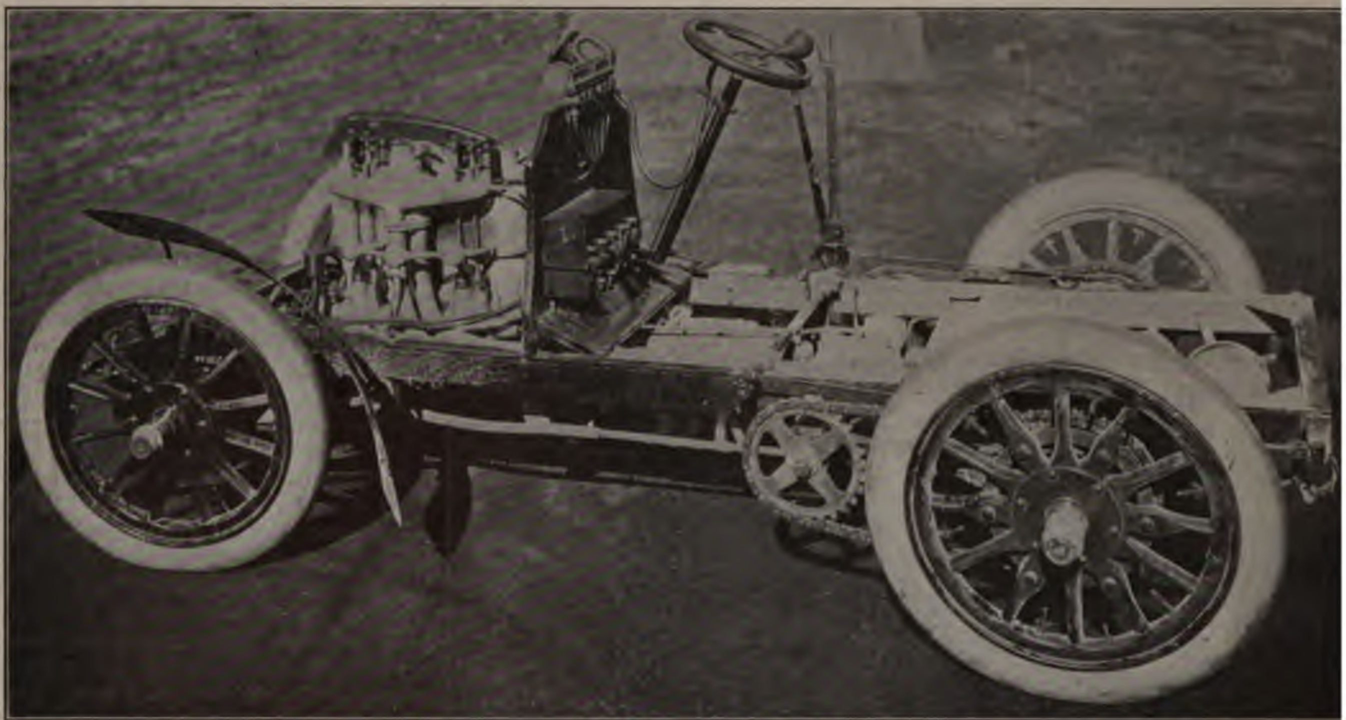
The muffling system (see sketch) comprises two cylinders attached to the chassis toward the rear. The forward and smaller one of the two is referred to as an expansion chamber and the other one as



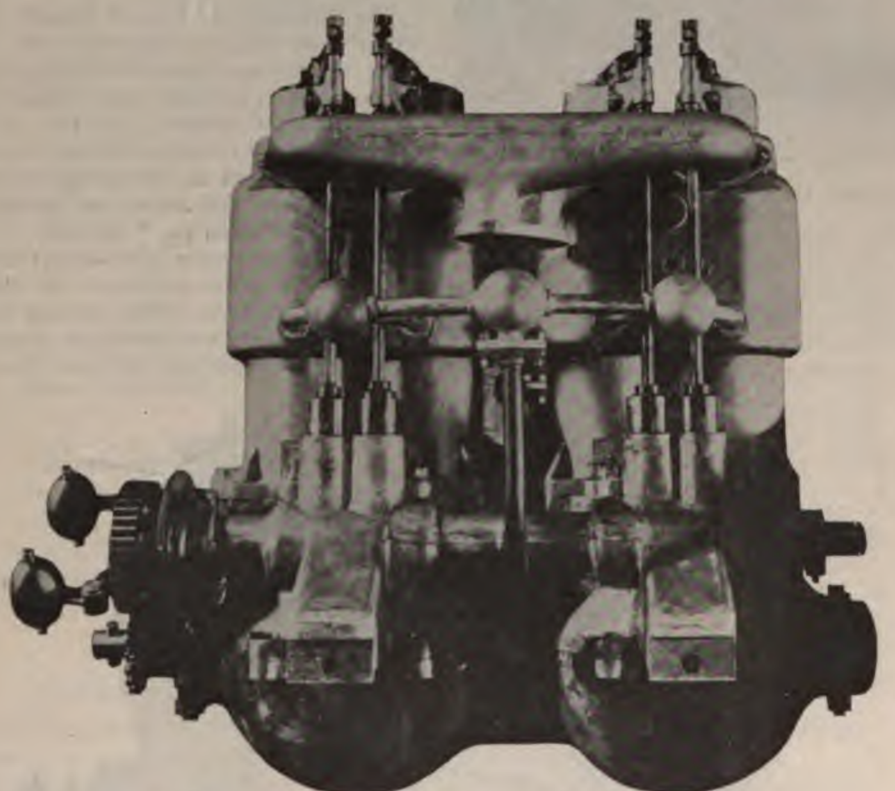
Concentric Valves.



Elevation of Motor, Showing Piping.



CHASSIS OF THE "PANAM" MACHINE.



SIDE ELEVATION OF MOTOR, SHOWING VALVE MECHANISM.

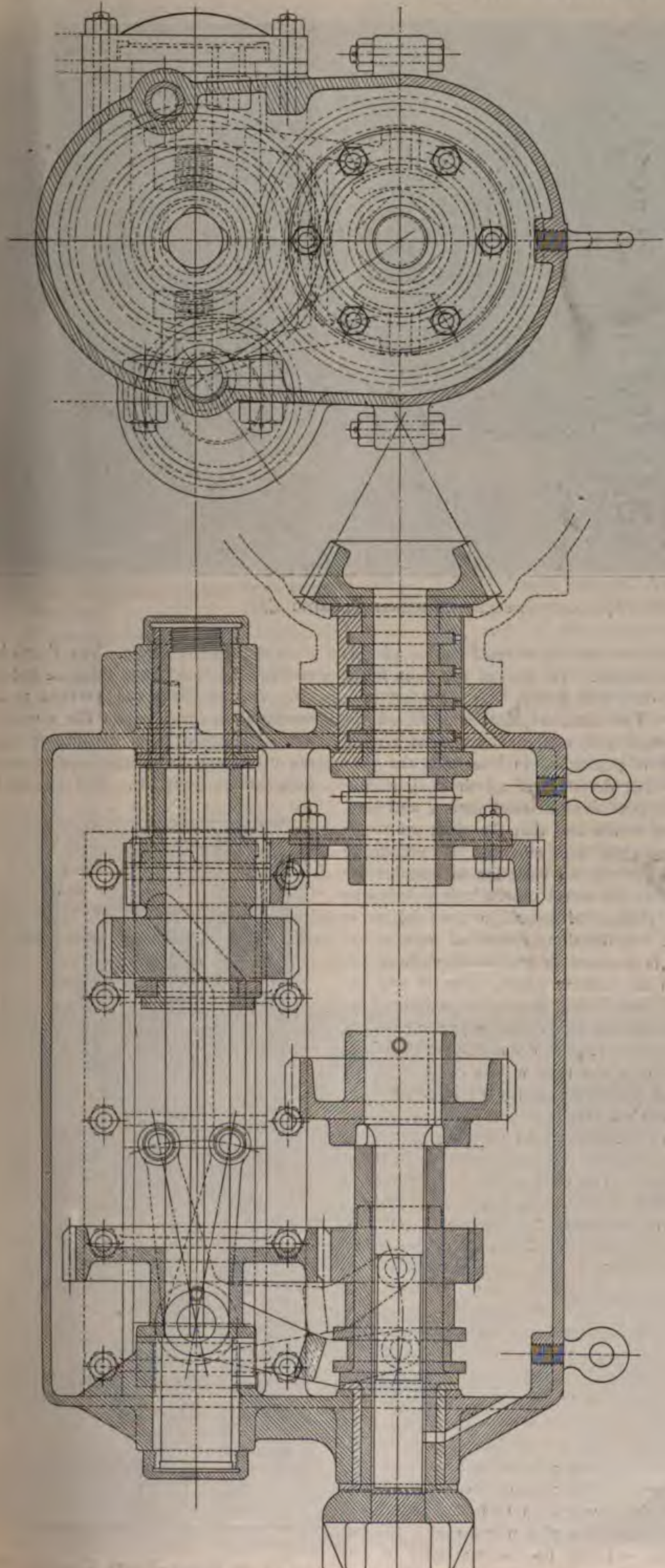
the muffler proper. The former consists of a cylindrical chamber with an interior concentric "horn" or sheet metal cone. The smaller end of this "horn" is fastened to the head of the expansion chamber, and has the exhaust pipe from the engine communicating with it, while the larger end is enough smaller in diameter than the inner diameter of the cylindrical chamber to leave a liberal passage all around. The exhaust products pass through the horn and back on the outside thereof, and then by a pipe to the muffler proper. The latter consists of concentric tubes, the exhaust being led into the inner one and passing through perforations in the tubes into the successive concentric spaces and out.

The transmission gear is of the shifting gear variety. It gives three speeds forward and one reverse, and drives directly on the high gear, with the countershaft running idle. The sectional view and elevation herewith show the full detail construction. It will be seen that for lower speeds and the reverse the po is transmitted through gears on a coun shaft, the pinions on the main shaft be shifted to effect the different combinati For the highest gear, or rather di drive, the main shaft and sleeve ther are united through a positive clutch. principle this gear differs little from s eral others recently brought out, but substantial form of construction, especi of the main transmission shaft to av disalignment of the parts, is worth noti It will also be observed that the hol shaft carrying the bevel gear is journ in the casing in substantial thrust beari The transmission is through these b gears to a cross countershaft carrying differential gear, which is of the ordin bevel type, and by separate chains from latter to the rear drivers. The sproc have twenty-eight and thirty-three te respectively and the chains are of subst tial construction.

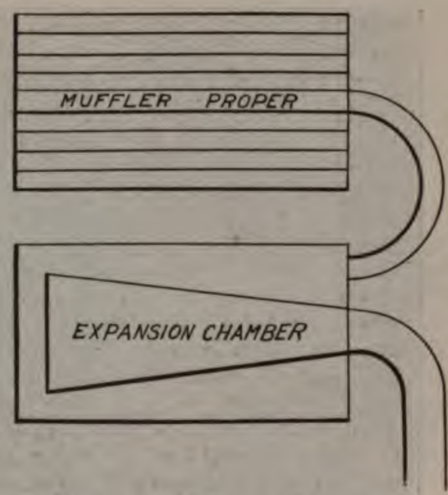
The transmission gear is completely closed in a two part casing.

The steering is effected by means of inclined hand wheel, and is, of course, reversible. The worm wheel sector is on the Morse-Williams system, to prev as much as possible all backlash. The f tion clutch is thrown out by means c pedal lever, and the same operation app a band brake to a drum on the differen shaft.

Two operating levers are provided, for controlling the change of gears and other (the outer one) to throw out clutch, disconnecting the engine, and s ultaneously to apply the band brakes both rear wheels.



Sectional Plan and Elevation of Transmission Gear.



Sketch of Muffling System.

The reverse is effected by an upward pull upon a hand lever located upon the floor behind the driver's feet.

All battery ignition is employed, but, after cranking the engine to draw a charge into one cylinder, the start may be effected through the medium of a switch on the car. Occasionally re-ignition may be effected by the switch without cranking, especially after the short stops.

The wheel base of the vehicle is 7 feet 4 inches, with standard tread of 4 feet 8 inches.

The frame is of wood, 3 inches by 2 inches, with an inner reinforcing strip of sheet steel 3-16 inch thick. The frame is securely bound at the corners with steel angle plates and appears to possess great strength.

Thirty-four inch wheels are used, with 4½ inch tires.

What is said to be a new feature in American construction resides in the radiating disks, which are of corrugated copper, blackened.

With the exception of the tonneau bodies, bonnets and sparking coils, which are imported, all parts of these machines are said to have been made in this country.

Recent "Knickerbocker" Productions.

The Ward Leonard Electric Company, Bronxville, N. Y., are bringing out their 1903 models of cars, viz., a 10 horse power single cylinder, a 15 horse power double cylinder and a 24 horse power four cylinder model.

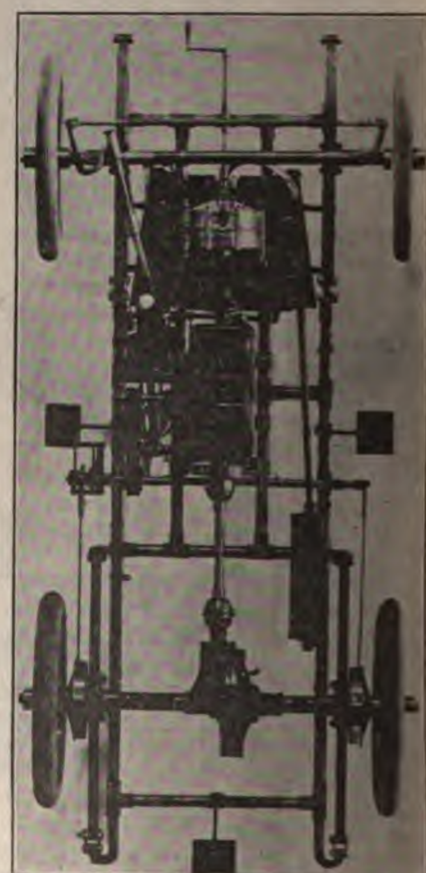
The single cylinder machine has a wheel base of 75 inches and a tread of 47 inches. The wheels have a diameter of 28 inches in front, and the diameter of the drivers is 30 inches. The cross sectional diameter of the tires is 2½ and 3 inches, respectively. Clincher tires are employed exclusively. Several of these machines have been shod with "G. & J." tires and the rest with Goodrich pneumatics. The front wheels run on ball bearings and have un-

CHASSIS OF THE 15 HORSE POWER KNICKERBOCKER TOURING CAR.

usually long hubs. The rear wheels are not keyed to the driving shafts, but have broached hubs that receive the squared ends of these shafts. The latter revolve in bearings which have two rows of balls, thus doing away with the end thrust, which one row alone would cause. Should a ball in one of the rows give out, the other row will do duty.

The frame of this carriage is of tubular construction and rests on long semi-elliptic springs. The motor is a 10 horse power De Dion, with single cylinder of 110x130 millimetres (4.4x5.2 inches). There are two disk flywheels in the crank case and a light flywheel on the outside that represents the female portion of the conical friction clutch. The latter has a movement of but 1/8 inch. It requires a pedal movement of 4 inches to move the clutch that amount, or, in other words, the reduction is 48 ÷ 1. The lost motion in other devices of this type has been dispensed with, and it is said that on a smooth level road the machine will start on the high gear. The drive on the latter is direct to the bevel gears in the rear. Between the clutch and the case of the variable speed gear a universal joint is placed, to relieve the crank and pinion shafts of unnecessary strains. The change speed gears are of the shifting variety and give three speeds forward and a reverse. All the former are controlled by a lever on the right hand side, outside of the body. brake, as well as the emergency brakes, is provided with a latch. No adjustments need be made in the gear box at any time. The pulley of the foot brake is located on the shaft just behind the gear box. This brake, as well as the emergency brakes, is double acting. The latter are hand controlled, and consist of two drums, one for *each* driving wheel. An equalizing device is employed in the control device of this brake system. To protect the foot brake from dust and water it is enclosed in a case. The Cardan joints are all of the dustproof type, and are located on a shaft which is practically in line with the gear shaft that drives it at all times, i. e., under all conditions of road surface and load. Owing to the fact that the shaft on which these joints are mounted is practically level, there is no variation in angular velocity of the bevel pinion unless it is due to a change of speed in the engine or gears. A breaking piece of square bar steel is inserted in the shaft midway between the Cardan joints. Should any unusual strain occur this piece will be fractured and the gears will be protected. The shaft ends cannot drop despite the fracture; only the rear wheels cease to drive. A new piece can readily be inserted without much delay.

On both sides of the master gears of the differential the live shafts revolve in roller bearings. The shaft of the bevel pinion is extended so that there is a bearing at both ends of the gear. To remove the latter it is only required to loosen a few nuts and withdraw the pinion. The thermo siphon system of cooling the water is employed. The water tank is located under the bonnet, but over the engine. At both sides there are rows of radiating tubes which communicate with the water tank above and the water jacket of the engine below. The entire cooling system holds 8 gallons of water. The internal resistance in the system has been reduced to a minimum by the use of large tube connections. Steering is by means of a 14 inch hand wheel, which actuates a pinion and rack. All lost motion is taken up automatically in this device. e pedal relieves the main clutc relieves the clutch and then applies the brake. The thumb levers control the spark, gas mixture and throttle. All of them are secured to shafts mounted in bearings on the steering column. The De Dion carburetor and coil are used, and an accumulator of two cells furnishes the current. The gasoline tank



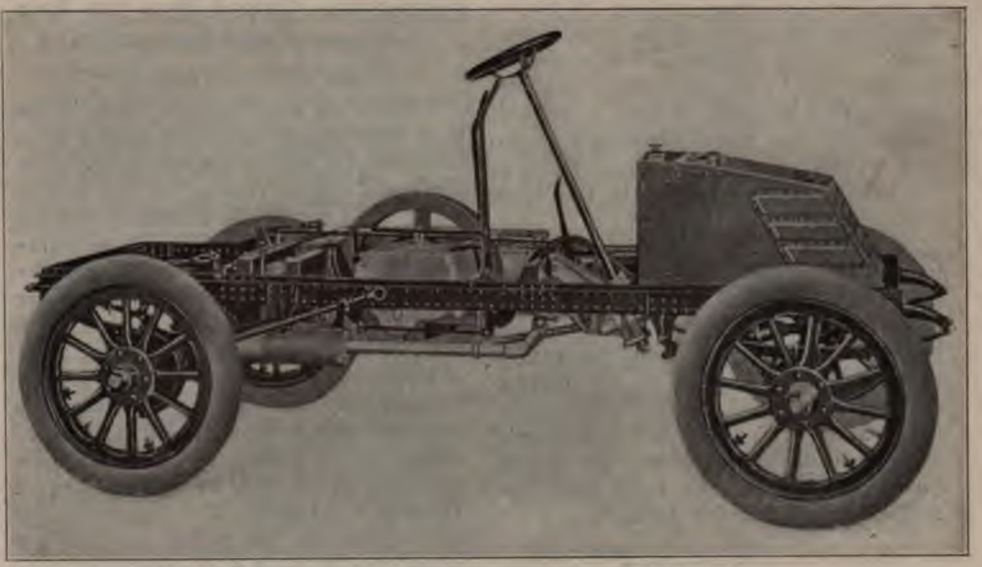
THE 10 HORSE POWER KNICKERBOCKER TOURING CAR.

is located under the main seat. Its capacity is 10 gallons.

The weight of this car, including supplies, is 1,550 pounds. The accompanying electrotypes show a bottom plan view and a side elevation of the chassis, and a perspective view of the complete car.

The 15 horse power double cylinder machine has a wheel base of 85 inches. The tires are 28x3 inches and 30x3½ inches respectively. The engine is either a Buchet or a De Dion. In the near future this type will be fitted with a four speed gear and a reverse.

The 24 horse power four cylinder car is also a tonneau, and has the same wheel base as the vehicle just described. The tires are 28 and 30x3½ inches, of the clincher variety. The engine is a Buchet, with cylinders cast in pairs with integral heads. A four speed and reverse gear will be employed.



CHASSIS OF THE 1903 WINTON TOURING CAR.

The Meserve Gasoline Truck.

The Meserve Autotruck Company, of Methuen, Mass., has completed a 2 ton gasoline truck which embodies some interesting features. It will be remembered that this company has done some creditable work in steam haulage; the steam truck which they constructed for the Pemberton Company, of Lawrence, Mass., having been in continuous practical use for about a year. They have now abandoned steam in favor of gasoline for truckage purposes. Their latest product is of attractive and substantial design, and in the tests which have been made upon it has hauled loads of 4,800 pounds over the steep grades in the neighborhood of the factory with the utmost ease.

The dimensions of the truck are as follows: Over all length, 14 feet 8 inches; length of platform, 10 feet; wheel base, 8 feet; gauge, 5 feet; diameter of wheels, 36 inches; diameter of tires, 3 inches (solid rubber). The wheels are of Archibald manufacture; all springs are of the semi-elliptic type, and all wheel bearings are plain. The front axle consists of a very strong latticed truss carrying ample steering pivots. This truss front axle is of exceedingly strong and, at the same time, economical construction, and is possessed of exceptional rigidity for stresses in a vertical plane. Steering is effected by means of a crank carried by a vertical steering column. The motion of the steering head is carried by means of several ball and socket joints to a worm which actuates the worm wheel that gives motion to the steering linkage. The frame of the truck is of wood, strengthened by steel trusses upon each side.

THE MESERVE GASOLINE MOTOR TRUCK.

The engine and transmission are located near the middle of the vehicle, and are carried upon a heavy drop frame of T irons, secured to the platform.

The engine is of the Upton make, and is of the double opposed cylinder horizontal type, with enclosed crank case. The cylinders are of 5 inch bore and stroke, and the motor develops 11 brake horse power at 850 revolutions per minute. Jump spark ignition is employed. The starting crank is placed in a convenient position, and geared to the engine shaft by chain and sprocket. The transmission gear is of the well known Upton type, with two speeds forward and reverse, and is coupled directly to the engine shaft. On the high gear the driving sprocket revolves with the engine shaft, but when the planetary low gear is in action the sprocket revolves once to each 3¾ turns of the engine.

A Baldwin chain transmits the power from the sprocket of the transmission device to a sprocket upon the countershaft, the bearings of which are also in the T iron frame. This sprocket is upon the casing of the Brown-Lipe spur differential. The ends of the countershaft carry sprockets which connect to the driven sprockets of the rear wheels. These driving wheels are carried upon heavy plain journals on the massive "dead" rear axle. Upon the differential casing acts a brake of peculiarly ingenious design, operated from a pedal. This brake is positively double acting.

The extreme end of the transmission gear shaft drives directly a small centrifugal pump, which forces the cooling water through a set of unflanged iron radiators carried upon the under side of the platform. The water tank, located just behind the driver's seat, is of copper, with air cooling tubes, and has a capacity of 18 gallons. The gasoline tank, located behind the driver's seat, has a capacity of 15 gallons.

The control of the vehicle is all centred

in one lever, different motions of which control the engine and throw in the three gears. A rotary motion of the handle of this lever varies the engine speed by shifting the spark position; pushing it forward engages the low speed; drawing it backward connects the reverse, and drawing the handle upward throws in the high gear.

When running upon the high gear the truck will make about 8 miles per hour, and on the low speed it will run at slightly over 2 miles per hour. The reduction between the sprocket upon the engine shaft and the sprockets of the driving wheels is ten.

The Meserve Company will immediately commence the manufacture of several more trucks along the same lines embodied in this their first product.

The New Winton Touring Car.

We reproduce herewith a photograph of the chassis of the new Winton touring car and a few descriptive details from the *Auto-Era*. The new car will have a double opposed cylinder engine with an increase of 33 per cent. in power over last year's model (20 horse power instead of 15). The body will be an improvement over last year's in that there will be a division in the wide front seat, and the tonneau will comfortably seat three passengers. All seats will have deep spring upholstering and the body springs will be longer, wider and more elastic.

Future Endurance Contests.

At the Stevens smoker in Springfield, Mass., on evening of Oct. 13, Pres. W. E. Scarritt proposed that in 1904 an endurance contest be held to St. Louis, the exhibition city. He said that the contest then in progress proved that practically all vehicles could complete such a journey. His idea was that the cars should be dispatched from New York with instructions to go to St. Louis, no regular route and time schedule being specified, but time limits fixed at ten and fourteen days respectively. Each car should carry an official observer. The driver would be at liberty to choose his own route and would have to secure himself the necessary supplies and accommodation for himself and observer; also look himself to the repairs necessary, which would be recorded by the observer. The A. A. A. or A. C. A. may take up the organization of this contest.

For next year a contest to Montreal, Canada, and back has been proposed. The route would be identical with that of the New York-Rochester contest of last year as far as Albany, and would then lead by Lake Champlain and through Western Vermont. The distance of the round trip would be 1,300 miles.

Impressions Gained from the Run—Features of Construction.

By Hugh D. Meier.

Whether the good showing made in the New York-Boston reliability contest is to be attributed entirely to the condition of the roads no one is in a position to say. There is no question in the minds of those who participated in both the New York-Buffalo and the recent contest that the machines were put to a much severer test last year. The highways in New York State cannot compare favorably with those of Connecticut and Massachusetts, and the average daily run was longer in the "endurance" contest than in the "reliability" event. In the former the maximum average speed was 15 miles per hour, as against 14 miles in the latter. This difference is of no consequence, but racing was indulged in last year by most of the operators, who, on that account, reached the controls before they were opened. Nobody was penalized or disqualified then for making detours or waiting to be admitted to the control line.

RAIN, DUST AND WIND.

That high speed on any roads, and particularly on rough ones, brings about rapid deterioration of an automobile and brings out structural weaknesses is common knowledge. No doubt each vehicle has its own critical speed, at which it is liable to go to pieces at almost any time. Machines that have broken long distance records have invariably required extensive repairs that seemed to be in disproportion to the number of miles that had been covered. The roads over which the cars traveled this year were not nearly as dusty as those along the Hudson, which it took two days to cover last year. Had there been such an amount of dust this time and such a strong wind blowing during any stage of this year's 500 mile event, the record sheets of the observers would show that stops had to be made to clean carburetors of various gasoline machines, and no doubt some of the fires of the steam vehicles would have gone out and required relighting. From Albany to Rochester rains were encountered that made swamps out of the roads and caused the carriages to slew and skid most everywhere. It was a hard test for running gears and a great strain on steering devices. All the makes of automobiles that were represented in both contests and gave a good account of themselves in the Buffalo run made an equally creditable showing in the recent struggle. In one instance a certain vehicle competed in both trials and came through with flying colors. A number of makers entered the same models this time that had proven their worth before. A little more weight and power were added in these cases, however.

That the short wheel base automobile has been relegated to the past, one is pleased to observe. Only models that had und[illegible] few changes inside of two or more years were identified with the short wheel base contingent. This applies to two makes of gasoline machines particularly and most of the light weight steamers. In the "B" class a wheel base of 6 feet and a little over was the rule. Some of the cars that had a shorter wheel base than that are to give way to 1903's models, which are to have the wheel base mentioned. Narrow tread vehicles there were quite a few—viz., the Pierce, Knickerbocker, De Dion, Torbensen and Apperson Brothers' cars. The latter were the only type "C" machines with a gauge narrower than standard.

SPRINGS.

It is a very good sign of the times that body suspension springs are coming in for a share of the attention of designers. Short springs were not much in evidence. Platform springs are becoming a little popular at last. Two of the Foster entries were equipped with four side springs and two platform springs. The former were semi-elliptics, about 38 inches long in front and 40 inches in the rear. Combined with the long wheel base and 32 inch wheels such springs cannot fail to give good riding qualities to any vehicle.

Kenneth Skinner's De Dion tonneau was hung on semi-elliptics front and rear and a platform spring at the extreme rear. The shackles of the springs in front were not secured to rigid brackets, but to flexible ones. The latter were leaf springs, consisting of four leaves each. If these springs were united they would constitute a platform spring. In this particular case the motor is located under a bonnet in front, and the shaft between the engine and gear box would interfere with a platform spring of the ordinary type. The "bracket" springs must be considered equivalent to a platform spring, and are certainly qualified to relieve the frame of stresses which must be taken up by it, wherever rigid shackle brackets are employed. One vehicle arrived at New York with a badly broken spring, and was the only one that had any trouble of this kind that came to the writer's notice. If the failure of the particular spring was not the result of a collision it must have been due to poor material, since in all the cars of the make in question unusually wide and heavy springs enter into the construction. Two manufacturers had carriages in the contest with side spring suspension, and there were seven of them all told. That they came through without failure of a single leaf goes to show that good springs are made and can be had in the market.

AXLES.

Not much can be said about axles. There were a lot of solid axles and about as many or more tubular ones. A great many had a bad case of backache, judging by their appearance. Why certain manufacturers, and not only those of cheap automobiles, are so little observant, not to say indifferent, in this direction passes comprehension. A truss under such axles

or a few pounds of metal added to them would correct a readily curable evil. To the writer nothing is as characteristic of slipshod methods as sprung axles. A shop superintendent who permits a vehicle to leave his shop with axles that give under the weight of the body, machinery and the normal complement of passengers, cannot be expected to turn out any good work nor to see to it that all parts are properly aligned. The rear axle of S. T. Davis, Jr.'s Locomobile touring car is of novel construction. The differential drum is located midway between the driving road wheels and is chain driven. The live shafts are not encased in tubes and four brake pulleys are provided. An eccentric keyed to one of the live shafts drives a boiler feed pump. Hub brakes are coming in for a great deal of popular favor. Two of the class "B" steam runabouts were equipped with them. Gasoline machines were quite generally fitted with a foot and a hand operated brake. The latter are known as "emergency brakes." Failures of brakes to stop vehicles or hold them on a hill were few, if any.

WHEELS AND TIRES.

Wire wheels were still in evidence. Another year may see few of them in use in connection with contest vehicles. One of the light gasoline cars ran into a curbstone and damaged a wheel, a wire one, which had to be repaired on the road. One wonders these days what has become of the advocates of single tube pneumatics, there were so few of them. Not that this type of tire is altogether bad. That is not the reason for the small representation. The clincher "rides" better, its inner tube is readily replaced and its cover may be used despite numerous perforations or punctures as long as the inner tube will hold air. Speaking of inner tubes, they are the strength of the double tube and its weakness as well. No chain is stronger than its weakest link. No clincher tire will remain inflated with a punctured inner tube. There is room for improvement in the latter. Let us have no more lapped tubes. They should be molded. Probably they ought to have slightly thicker walls. In connection with the tire question it should be said that the tire manufacturers' advice and suggestions are not heeded by some builders of automobiles. How would the latter make the blunder of calling on 28 or 30 inch rollers to carry a vehicle weighing 1,400 to 1,600 pounds, exclusive of the weight of from two to four passengers? Cars intended for a like service two years ago weigh from 50 to 100 per cent. more today, and only half an inch to an inch has been added to the cross sectional diameter in that time. This cannot be good practice. In the heavy class there seems to be a standard which was established abroad some years ago and has not been found wanting since.

The tank capacity of the contesting vehicles proved to be ample in the majority of cases. The light and medium weight gasoline cars carried from 5 gallons of fuel to 7 and more. The Knickerbocker, B 15, had an 8 gallon tank, which proved to be more than ample for the 96.6 miles of October 11 and 13. Five gallons of gasoline were consumed on each of these days—a good showing for a high speed engine. The steamers did not take water on frequently between controls. This was due to the time limit clause, and probably due to increased tank capacities. The White vehicles made no stops for water, and could not have evaporated much en route, provided that the small hole in one of the header castings is the only place where steam that was not condensed could escape. One of the gasoline runabouts with thermo-syphon circulation generated a good deal of steam one afternoon and had to take water between controls. The combined tank and radiator in this case are located in the rear box of the body, where a sufficient draft cannot well be had. The Knickerbockers, however, had no trouble with their cooling system, which is also of the thermo-syphon type. A generous number of radiating tubes are provided, which are located in a row at each side of the bonnet in front in the case of the 10 horse power car, and grouped in four rows (deep) in front of the bonnet in the 15 horse power double cylinder machine.

CHAINS AND TRANSMISSIONS.

Heavier chains were used this year to drive the light steam runabouts. The block chain was seen on but a few vehicles. Two makers who employed planetary gears in their variable speed mechanisms a year ago entered 1902 model machines which were fitted with sliding gear transmissions. The gears of one carriage were evidently of too fine a pitch (No. 8) and did not engage smoothly. The writer discussed the question of pitch with a well known builder, whose gear made but a minimum amount of noise when shifting, and was informed that No. 7 pitch is quite satisfactory as long as the pinions are not too small and the space between the teeth is cut slightly larger than in standard gears.

There is invariably more vibration to a carriage propelled by a single cylinder gasoline motor than in a vehicle driven by a double cylinder engine, provided that the cranks are properly set in the latter case. If the former type has a vertical cylinder the body will rise and fall when it vibrates. A single cylinder horizontal engine causes the body to vibrate in a horizontal plane to and fro. There is plenty of room for improvement here, which must be made, else the single cylinder will be abandoned. One particular car with a horizontal motor would have rolled back and forth had the brake not been applied. The user of an automobile is warranted in demanding that it should not shiver all over when the rig is at rest and the engine is running. To and fro vibration is hard on the body, the springs, wheels and tires, and is more destructive than vibration in a vertical direction.

ENCASED PARTS.

Enclosed machinery will soon be specified by every intending purchaser. Manufacturers that allow their cranks, pistons, connecting rods, differentials, etc., to run in the open air where gritty matter can get in, had better get into line with the progressive ones in this direction. Whether the recent trial has demonstrated the need of casings or not matters little; 2,000 or 3,000 miles of traveling will prove that protection is most desirable. The White entries had enclosed engines this year, as did the Locomobile touring car and a few others. The Oldsmobiles had leather chain covers and the Knickerbockers encased Cardan joints, packed with grease.

Better bodies and improvements in them, such as inclined footboards and places for tools and luggage, were well represented. One steam and five gasoline cars had convertible front boots. But few carriages were minus fenders and some of them had front axles placed further forward to facilitate ingress and egress.

HIGH COMPRESSION MOTORS.

The rather unusual speed of some of the light gasoline machines excited no little wonder. Standard vehicles of this kind are not generally credited with speed or hill climbing ability, and it was the opinion of some that special engines had been mounted for the test. Some motor cycle manufacturers equip their "standard" bicycles with special high compression motors for racing purposes. Perhaps this will explain the good showing of the light rigs. A number of the class "C" touring cars proved to be poor hill climbers. All the steamers and multiple cylinder explosive motor machines climbed all grades without assistance.

Reliability Run Awards.

Secretary Butler, of the Automobile Club of America, reports that the tables showing the percentage of marks achieved by the contesting cars in the Reliability Run have not yet been prepared.

It has been found, however, that about a dozen cars made perfect runs—i. e., without any penalized stops. The owners of these cars have therefore all qualified equally for the President's Cup, and the club is in a dilemma as to the best means of satisfying all claimants.

It has been proposed, as a solution of the difficulty, that the names of all qualifying contestants be engraved upon the cup, which latter should be retained by the club as a sort of "allied trophy." In addition each person whose name is so inscribed upon the cup to receive from the club a gold medal indicating his performance and his title to the cup. There will probably be little difficulty in the apportionment of the remaining cups, because it is not likely that any two or more cars will be found to have been penalized the same number of marks.

MINOR MENTION

Wm. C. Stewart, Lynn, Mass., inventor of a patented boiler, is at work on a complete vehicle to demonstrate his ideas.

Willard S. Achorn has opened an auto station at 197 and 199 Broad street, Lynn, Mass., under the title of the Oxford Auto Stable.

The proposed removal of the Peerless Manufacturing Company from Cleveland to Lorain, Ohio, is said to have fallen through.

The H. A. Tuttle Manufacturing Company, Stamford, Conn., has been incorporated under Delaware laws with a capital of $100,000.

Glazier & Briggs, Lynn, Mass., manufacturers of the Sagamore marine motors, are about to take possession of the entire building in which they are located.

Ellicott Evans has been elected president of the Buffalo Automobile Club, H. A. Meldrum vice president, John M. Satterfield secretary and E. R. Thomas treasurer.

The Stanley Carriage Company, Newton, Mass., are now getting out their 1903 model, which will be longer in wheel base and will show some changes in body design.

Mr. and Mrs. Charles J. Glidden, of Lowell, Mass., arrived from Europe Saturday after touring 5,125 miles on the Continent in a 24 horse power gasoline vehicle.

The Geneva Automobile and Manufacturing Company, Geneva, Ohio, have made some changes in the engine of their 1903 model. The construction is considerably heavier.

The Bray Manufacturing Company have shipped to their Chicago and St. Louis offices large consignments of their auto lifting jacks in order to supply the Western trade.

Mr. and Mrs. Fred S. Howell, Albany, N. Y., recently returned from an automobile trip to the White Mountains and back in a 5 horse power De Dion-Bouton motorette.

The Auto Vehicle Company, Los Angeles, Cal., have given their new 6 horse power gasoline vehicles a thorough test and are preparing to turn them out in large quantities for both pleasure and business.

James S. Holmes, Jr., general manager of the Remington Automobile and Motor Company, Utica, N. Y., has been succeeded by L. Malcolm Graham. E. J. Otis will also succeed F. P. Hilton as treasurer on November 1.

Charles E. Miller, 97 Reade street, New York, announces an English importation, "the umbrella coat," similar to the rain coat illustrated in THE HORSELESS AGE last spring, fitting tightly around the neck and wrists.

After November 1 the price of the Crestmobile will be $100 less, Model B selling at $550 and Model C at $500.

Githens Brothers Company, Chicago, Ill., has been incorporated with $30,000 capital by W. L. Githens, F. C. Donald and James Levey.

The postponed races of the Chicago Automobile Club, which were to have taken place at Joliet, were run at Cicero on Friday and Saturday last.

The Winona (Minn.) automobile factory has turned out a 12 horse power gasoline automobile and is at work upon a 20 horse power machine.

The N. A. A. M. has issued a bulletin (No. 6) dealing with the conditions of exhibiting automobiles at the Louisiana Purchase Exhibition in 1904 and the coming Paris Salon.

The Harvard Automobile Company, Cambridge, Mass., headquarters for the Harvard Automobile Club, have moved from 8 Palmer street to the corner of Massachusetts avenue and Bow street.

A new automobile plant is about to start up at Lynn, Mass., in the three story brick building at 306 Broad street. Operations will be commenced about the first of the year, the motive power of the vehicles turned out being steam.

The Cleveland Automatic Machine Company, capital $1,000,000, is the new title of the Cleveland Machine Screw Company. The new corporation is registered in New Jersey and A. L. Garford, president of the Automobile and Cycle Parts Company, is president.

The Toledo Motor Carriage Company has secured the Olds agency for that city, while the Ralph Temple Automobile Company, of Chicago, has contracted for the Illinois agency of the products of the International Motor Car Company, having agreed to take during the year no less than 175 automobiles, steam, gasoline and electric.

Legislative and Legal.

A by-law regulating the speed of automobiles is to be passed by the Toronto councils.

Charles Brach, driver for a local automobile company, was arrested at Buffalo recently for fast driving.

John B. Martin, New York, was charged with fast driving on the West Side last week and was held in $500 bail for Special Sessions. The policeman who made the arrest had a stop watch.

W. J. Schultz, Buffalo, N. Y., is being sued for $1,000 damages by the guardian of an eleven year old boy who was run over by defendant's automobile last July, when, it is alleged, the vehicle was being operated at illegal speed. Schultz claims the accident was unavoidable because the boy ran out in front of the machine. The jury gave a verdict of $345 for the plaintiff.

The Lansing, Mich., council has passed the ordinance limiting speed to 10 miles on paved and 12 miles on unpaved streets.

Alameda, Cal., has passed an ordinance limiting the speed of automobiles to 8 miles an hour. This is the town where Mrs. Stewart was recently killed.

The Road Drivers' Association of Philadelphia is opposing the 10 mile speed limit proposed in the Automobile Club's bill, favoring the present 7 mile maximum.

It is reported that District Attorney Smith, of Suffolk County, Long Island, has withdrawn the offer, made in the early part of the summer, of $50 reward for information leading to the arrest and conviction of violators of the automobile speed laws. It is claimed that the offer has had the desired effect and drivers of automobiles on Long Island are now more considerate of other users of the highway.

The Automobile Club of America and the American Automobile Association are preparing to lend their assistance to Felix Warburg, the New York banker, against whom $12,070 damages were recently awarded at Trenton, N. J., for causing a runaway with his automobile. It is claimed that no criminal negligence was shown on the part of Mr. Warburg's driver and that the verdict was therefore prejudiced.

The Kansas City Vehicle Ordinance.

The Kansas City vehicle ordinance has at last been gotten into shape. In the downtown districts speed is limited to 8 miles an hour; in the outlying districts it is 10 miles an hour.

For automobiles the ordinance provides that side lighted lamps, clearly visible at a distance of 100 feet, must be provided, and that owners of automobiles must register with the license inspector. Other provisions are as follows:

Lamps—Numbers of machines must be painted in red and legible figures at least 1 inch long upon the front and side of each lamp.

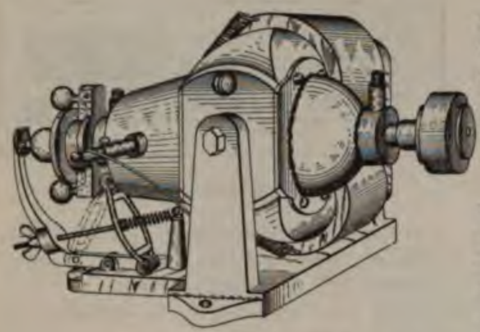
Numbers—On every automobile there must be painted or printed in white upon black background legible figures at least 8 inches in height upon the rear of the bed or body of such vehicle.

Chauffeur—He must be duly licensed, and undergo an examination before the board of engineers as to his capacity and skill. A fee of $3 shall be charged for each license and $1 for renewal.

Precautionary Measures — Chauffeurs must reduce speed of automobile, and if necessary come to a stop when horses show evidence of fright.

At Crossing—Approaching crossings speed must be reduced to a less rate than the specified 8 and 10 miles an hour.

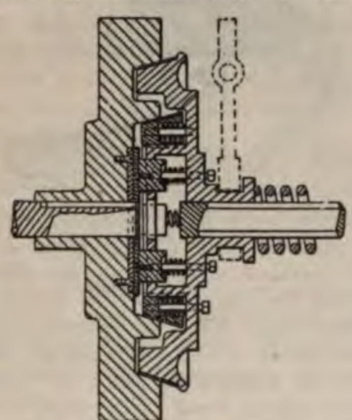
Penalty—Violation of the ordinance will be deemed a misdemeanor, and upon conviction the fine to be imposed will be not less than $1 nor more than $500.



tegral with their respective ball weights. These bell cranks press against a disk which revolves around the armature shaft, being carried around by friction. This disk and its hub are movable longitudinally and force a fulcrumed lever out when the balls fly apart. A coiled spring offers resistance to this action and affords means of adjustment and regulation. To the extreme right end of the lever a link is secured, which is screwed to the body of the dynamo by means of a link. When the link is raised by the action of the balls on the disk and the fulcrumed lever the dynamo is raised—i. e., swung around its fulcrum just enough to disengage the driven pulley.

710,685. Friction Clutch.—L. J. Harris, of New York, N. Y. October 7, 1902. Filed February 6, 1902.

The object of the invention is to provide a device that will transmit power from one



shaft to another by the gradual frictional contact of relatively movable and yielding friction disks and conical bearing surfaces differentially engaged. Undue slipping and resultant wear are obviated. The motor's flywheel has two annular conical recesses into which the corresponding male members of the clutch project. A plate is also secured to the balance wheel, against which a similar disk abuts. The latter, like the smaller conical clutch, is longitudinally movable and has springs back of it which exert a yielding pressure. The disk clutch is engaged first. The small conical clutch engages its female cone and eventually the large conical clutch takes a hold.

710,728. Valve and Valve Mechanism for Gas Engines.—W. O. Worth, of Chicago, Ill. October 7, 1902. Filed May 28, 1900.

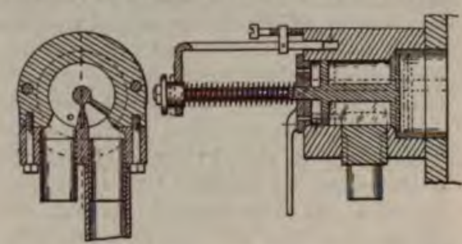
The invention relates to a slide valve which is operated by a cam and controls the incoming of the charge and the outgoing gases.

710,768. Hose Coupling.—W. A. Ford, of Louisville, Ky. October 7, 1902. Filed August 7, 1901.

There are two nipples, each of which are slipped into the ends of pieces of hose. One of the nipples has a flange and the other is threaded. A nut is screwed over the latter and effects a tight joint by means of a plug screwed into the nut and a washer between the nipples.

710,840. Valve for Gas or Gasoline Engines. — A. P. Brush, of Detroit, Mich. October 7, 1902. Filed October 4, 1900.

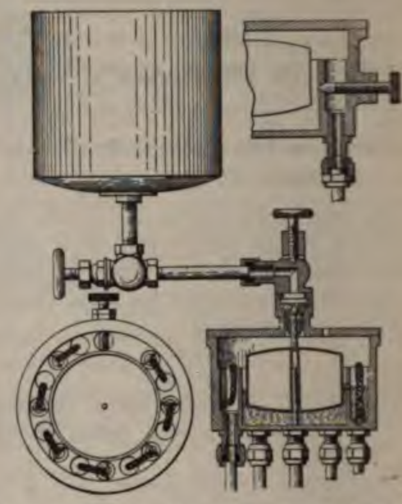
The invention has for its object an automatic proportioning inlet valve for gaso-



line motors which is of the vacuum opening type. The valve has an integral wing between the valve disk and the other disk shown in section. There is a tongue in the casting, to which the air and gas admission pipes are secured, which projects to the stem of the valve. This tongue and the wing constitute the walls of a passage through which the gas is admitted to the engine cylinder. Air enters the cylinder through the large passage that represents the other chamber. If the tongue and the wing are brought closer together there will be less gas and more air sucked in. By relatively adjusting the wing and tongue the proportion of gas or saturated air and free air may be regulated. The amount of lift of the valve is controlled by the stop shown in the cut. If the amount of stop is increased or decreased the ratio of air and gas or air and saturated air remains constant; only the qualities of both are changed.

710,928. Multiple Oil Feeder.—Alexander Winton, of Cleveland, Ohio. October 7, 1902. Filed June 20, 1901.

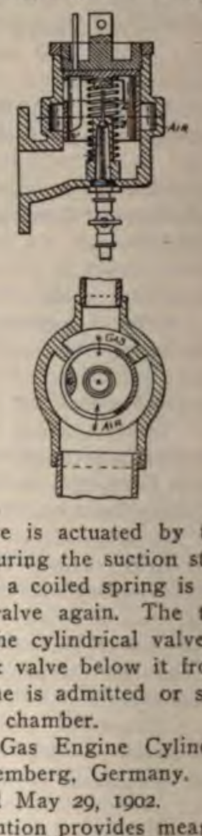
The apparatus consists of an oil reservoir and a receptacle in which a float controls the level of the lubricant. There are a number of chambers grouped around the float chamber into which wicks dip. Adjoining these chambers are similar chambers with drip pipe connections. The lubricant is carried up by the wicks and runs down until it drips off into the tubes. Communication between the float chamber and the wick feeding chambers, is effected by means of holes drilled into the wall of the former. The engine cylinder is not fed with oil by means of a wick; but in the direct way shown in one of the sections and in the plan view. A needle valve is provided to regulate the flow of oil. It is not necessary to shut this valve



off or withdraw the wicks when shutting down the motor; but only necessary to close the elbow valve in the pipe between the tank and the float chamber.

710,841. Mixing Valve for Cars or Gasoline Engines.—A. P. Brush, of Detroit, Mich. October 7, 1902. Filed June 10, 1901. Renewed September 11, 1902.

The valve proper is a piston valve, which has two windows, one for the gas, the other for the admission of air. The latter enters the annular chamber surrounding the valve and mixes with the saturated air after entering the valve chamber on its way to the cylinder. The



piston valve is actuated by the vacuum produced during the suction stroke of the piston, and a coiled spring is provided to raise the valve again. The teat on the inside of the cylindrical valve forces the small check valve below it from its seat, and gasoline is admitted or sprayed into the mixing chamber.

710,911. Gas Engine Cylinder.—H. E. Ebbs, Nuremberg, Germany. October 7, 1902. Filed May 29, 1902.

The invention provides means for cooling the webs between the passages through which the spent gases in two-cycle engines escape. In case of fracture of any of these webs the casting to which they belong may be replaced without having to renew the entire working cylinder.

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...EVERY WEDNESDAY...

Devoted to Motor Interests

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:or of Safety in the Light Carriages.

ll known that the modern bicycle i very small factor of safety as with the factors employed in va- lines of mechanical engineering. ter and smaller factors of safety employed at different stages in pment of the bicycle, and the evailing factors have finally been on as the most suitable, every- idered.

rious that a very large factor of safety would entail a number of serious disadvantages, particularly the waste in the use of the machine of a good deal of muscular energy, which is a valuable commodity and must be economized. In addition, the speed which can be maintained is less as the weight of the machine increases. The chief advantage of the bicycle being the saving it effects in time and muscular energy in order to secure its full inherent advantage, it follows that the factor of safety employed in its construction must be made as low as is consistent with personal safety and reliability on the road.

Somewhat similar considerations apply in the determination of the factor of safety in automobile construction. Unnecessary weight results in waste of power and increased tire cost and must therefore be eliminated. It is logical to conclude that as the factor of safety is reduced the liability of breaks increases; the frequency of breaks will vary little with the change of the factor of safety as long as the latter is comparatively large, but quite rapidly as the factor approaches a minimum limit. The most advantageous factor of safety will be such that the waste of power and other losses due to greater weight entailed by a small increase in the factor of safety would just balance the advantage of greater immunity from breakdown thus secured.

It has been assumed here that an increase of weight results in an increase of the factor of safety. This assumption is undoubtedly justified as being generally correct. It should be pointed out, however, that, since with the addition of weight not only the strength of the vehicle is increased but also the load that must be borne by the supporting parts and propelled by the motor equipment, the factor of safety varies in reality only slowly with an increase in weight. And in one respect—tires—the factor of safety seems to actually decrease with the weight. That is to say, more tire troubles may be expected with a heavy vehicle than with a light one if the weights of vehicles and of tires are in the same proportion in the two cases.

The factor of safety in automobiles must be greater than in bicycles, on account of the greater speed of the former and the fact that they are frequently operated on roads on which bicycles could not run. On account of the greater speed and weight of automobiles more serious accidents may arise from breakages than with bicycles. Waste of power is also less important in automobiles, owing to the comparative cheapness of mechanical power generated by a prime mover.

Judging from the results of the Reliability Contest, the safety factor employed in the majority of light and medium weight machines is quite sufficient, except as regards some of the running gear parts which have to stand the brunt of the road shocks. The fact that two vehicles ran nearly the entire distance with badly bent front axles is rather indicative of sufficient strength than otherwise; it proved that the bending of the axle had been caused by unusual incidents and that no such severe shocks were imposed upon the axle in all the rest of the run, for the bending certainly weakened the axle, and had shocks of this severity been repeated, still further bending and probably breakage would have resulted. That the axles bent so much without breaking and then endured the strains of all the rest of the run must also be considered a sign of good material.

Mechanically Operated Intake Valves.

In the recent Reliability Contest a number of stems of suction operated intake valves broke. It would seem at first sight that there ought to be little cause for the breakage of these parts; the intake valve is not subjected to the blow of a valve lever, like the exhaust valve, and its spring is comparatively weak. Yet it must close with substantially the same velocity as the ex-

haust valve, and the force of impact per unit of weight when the valve seats is therefore about the same in the two cases.

To secure a prompt closing of the intake valve all its parts must be made as light as possible. The head has to withstand the pressure of explosion directly, and must therefore have a certain thickness and weight. The stem, on the other hand, does not seem to be subjected to any particular strain, except the tension effect of the valve spring pressure, and these stems are therefore made exceedingly light. There is no doubt that the breaking of the stem is the result of crystallization by the shock the material receives as the valve seats after each operation.

There seems to be a tendency toward the adoption of mechanically operated intake valves, both for high speed and low speed motors. The adoption of this valve for motors of high piston speed is easily explained. Mechanical operation permits making the valve larger, heavier and stronger so as to endure more rapid closing. The larger the valve opening and the shorter the time of opening and closing the higher will be the speed at which the motor gives its maximum power and the greater therefore its horse power.

In low speed motors this consideration does not apply. The motor speed is purposely kept down to reduce wear and tear and a complete charge can easily be obtained with the ordinary suction intake valve. The reason for the adoption of the mechanically operated intake valve must therefore be of another order. It is without doubt, because mechanically operated valves, in spite of the added complication, are less bothersome than automatic valves. It is well known that the spring pressure of an automatic valve must be minutely adjusted if the valve is to give good results. If the spring is too stiff the valve opens insufficiently and the motor is choked; if, on the other hand, the spring is too slack the valve closes late, some of the charge drawn in is forced out again before the valve seats, and in extreme cases backfiring occurs. What aggravates the matter is that a valve spring once correctly adjusted will not remain adjusted, even if precautions are taken to prevent dislocation of the spring stop on the valve stem. The effect of the rapid compression and extension of the springs is to reduce the elasticity, and the springs therefore lose some of their original pressure in course of time. This effect is the more pronounced the greater the ratio of the compression to the total length of spring, and as in practically all automatic intake valves the spring is inclosed it is necessarily short and the above ratio large.

Originally automatic valves were the general practice. The present adoption of mechanically operated valves is a deviation from this practice and has not yet become sufficiently general to form a conclusion whether the mechanically operated valve will eventually supersede the automatic valve or not. Both kinds of valves are, of course, quite practicable, and the question of the superiority of one or the other involves some points that can only be decided by long experience with both kinds.

Tarpaulin Protection for Mechanism.

The fact that practically all the manufacturers who competed in the recent Reliability Trials had provided their machines with tarpaulin protective sheets under the mechanism and in some instances with leather protecting cases over the chains ought to be an object lesson to every private owner. There are several reasons why these protective devices are not provided by the manufacturers on their regular machines. They are not a necessity. In running in the city many users might prefer not to use the sheets below the mechanism, as they detract somewhat from the appearance of the machine. These protective sheets must therefore be considered as extras, and there is sufficient competition in the automobile business to discourage the practice of furnishing extras free of charge.

The value of such protective devices may be considered as well established by the generality of their use in the contest. Many of the lighter machines had been partially stripped, and if it had not been considered that the sheets would serve a useful purpose they would certainly also have been left off.

It is hardly fair to assume that the machines which used these protective sheets were of defective design as regards enclosing of the working parts. There are no machines in which some of the parts carrying the ignition current are not exposed. As long as the weather is dry no trouble is likely to result from this, but there is no doubt that several days of rain in the contest would have proved very hard on the ignition outfits of nearly all the gasoline machines. Some vehicles have exposed friction drives of spark generators, pumps, etc., and these, too, might have been expected to give some trouble had the roads been very muddy. In that case the tarpaulin sheets would have been of the greatest benefit, and it may be assumed that in most cases these sheets were applied in anticipation of bad weather during the run.

In conclusion, when going on a tour it is well to protect the mechanism by a tarpaulin sheet, or at least to carry a sheet along for use in case of rain. Leather cases for protecting the chains also seem very useful for increasing the efficiency and life of the chains, and are well worth the consideration of those who have had trouble of this kind.

Automobiles in Military Service.

The present fall has seen a further extension of the use of automobiles in army manœuvres by all the leading military powers of Europe. With but few exceptions the vehicles have proved equal to the task imposed upon them, which should lead to the definite adoption of automobiles for certain branches of army transportation. One problem that still remains to be solved is the operation of heavy transport vehicles across country, a problem of great importance from a military standpoint. Traction engines proved very serviceable in the war in South Africa, but the practicability of these engines and also of motor trucks with the ordinary small wheels is limited to roads, as was shown by the War Office trials last winter. The automobile at present serves its most useful purpose in army work as a means of rapid transportation of the officers and staff and in the signal service.

This reminds us that the United States army is apparently making very slow progress in the adoption of automobiles, although it was among the first to try these vehicles. The record for reliability established in the recent contest ought to convince the authorities that automobiles have now reached a state of perfection where they can be used to advantage in our army. The work demanded of a vehicle in army use would be somewhat similar to that accomplished in the Boston run, although greater speed might be demanded than was allowed there. This being the case, the War Department would do well to test some of the better vehicles now upon the market. This course would be more certain to lead to success than its own experimentation in automobile construction.

ersing Levers Should Be Locked.

lents continue to occur owing to engines on automobiles automati-eversing under certain conditions. nditions which cause such auto-eversal seem not perfectly under-ut a number of the accidents have d while the machine had run out 1 on a hill and had been put on the nomentarily to raise steam; when ottle is opened again the machine ackward instead of forward. There e a reaction on the reversing ism when the engine starts back-on the brake being released, or else ion of the steam pressure or of

In any case the repeated acci-f this sort have proved that there er in an unlocked reversing gear, hough the probability of the nec-onditions for such an accident may small, there is no excuse for this n reversing gears, as it is so easily d. We would recommend to all ers of steam carriages to see that achines are equipped with an ar-ent for positively holding the re-lever in the extreme positions or e such an arrangement applied di-pon receipt of the vehicle.

e Dealers and Automobiles.

most progressive among vehicle ve long since recognized the im-part the automobile is to take in comotion in the near future, and them are beginning to extend their s to include handling automobiles. s no reason why automobiles and ehicles cannot be sold with advan-the same dealer. It is true that a should thoroughly understand the he handles, but this condition can y satisfied by an intelligent vehicle f he will subscribe to a good trade The question has lately been dis-by the *Vehicle Dealer*, which advises ers not to "overlook a considera-the question of handling automo-well as harness." There is a field directions.

Automobile Driveway.

utomobile driveway from Central a through Mexico and west to San co and from there to the city of ork across the American continent idea which is being projected by . W. Coronel, of California, who is ity, says the Mexico City *Herald*.

Conclusions from the Reliability Contest.

BY ALBERT L. CLOUGH.

(Concluded.)

The gasoline vehicles in the present test afforded a very different general appearance than did the cars which were gathered for the Buffalo run.

In that event the machines embodying Continental practice, with the engine located under a bonnet in front, formed a very small part of the total and were looked upon with some curiosity by automobilists, while in the test just concluded the foreign model was most largely in evidence and seemed to be rather generally accepted as the ultimate type.

ENGINE POSITION.

Probably no subject of discussion received more attention among the fraternity than that of engine position. Everyone seemed to be hastening toward the adoption of forward engine position, and even one prominent and successful builder of steam vehicles announces a 1903 model built upon these lines. Whether this construction necessarily furnishes the advantages to steam propulsion that its advocates find it offers to vehicles propelled by the gasoline system is, it would seem, yet to be demonstrated, and it is hoped that the fulfillment of the popular demand will be much tempered by sound engineering counsel as to this point.

THE BONNET.

It is rather interesting to see the attempts of the manufacturers of vehicles hitherto most successfully propelled by low speed single or opposed cylinder horizontal engines carried in the body to adapt their engines to the public demand for a "bonnet." In quite a number of instances two cylinder motors of the opposed type are found mounted in front with their axis transverse to the vehicle length. A bonnet which, when lifted, should expose the whole motor would almost of necessity be too long for beauty or practicability, and so the bonnet as constructed does not expose to view the rear cylinder, which remains about as inaccessible as before and demands the lifting of the carriage floor for inspection or adjustment of the rear cylinder and its attachments. One manufacturer who employs a double opposed cylinder motor has placed it with its axis longitudinal of the vehicle. It is rather a hard squeeze to stow away the necessary power without speeding up the engine beyond the limit of the most conservative practice, and of course there has to be a bevel gear somewhere.

By the way, who knows just what are the relative efficiencies of bevel gears and chains in automobile service? One would like to see some tests published. In one machine, which was conspicuous in this test and very high powered, the engine occupied nearly the whole length of the vehicle. The balance wheel was located under the front seat, the front cylinder was exposed by raising the bonnet and the rear cylinder by removing the tonneau.

It must be evident after looking the various attempts over that the horizontal motor, especially of the opposed cylinder type, does not lend itself to a forward location, with a bonnet to cover it. The vertical motor is the only form suitable for such disposition.

THE AMERICAN TYPE.

This is to be regretted, as quite a number of the most important American manufacturers have settled, after extensive experimentation, upon the opposed cylinder slow speed motor as the type embodying the greatest flexibility, reliability and freedom from vibration, consistent with an avoidance of undue complexity and multiplication of parts, and it must naturally be a matter of regret to them to be forced by popular demand to discard this well developed type. There are two or three well known American manufacturers who are accomplishing splendid results with this form of motor, having a powerful balance wheel. They were the very best hill climbers in the "bunch," and made a far better showing in this regard than did the Continental types of like rating.

If the edict has finally gone forth that the engine shall be placed in front, what type is likely to be adopted? Assuming that it must be of vertical design it will remain for the manufacturers to say how many cylinders—one, two, three or four. It will hardly be likely that sufficient power will be found in a single cylinder of such length as to conveniently be placed under a bonnet of practical height, and its vibration and lack of flexibility will be found unsatisfactory to the former users of double opposed cylinder engines. There would also probably be a tendency to design such an engine for a higher speed than otherwise desirable, as its dimensions would be somewhat restricted by the conditions of the problem. A two cylinder twin motor would doubtless be found to do the work very satisfactorily, although its qualities would not compare favorably with a double motor of the opposed type. It is only when the three cylinder motor is adopted that the qualities of the motive power become equal to those of the double opposed engine. This is also true of the four cylinder engine, of course.

It is to be regretted that the application of the double opposed motor to the "engine in front" construction is not a more practical proposition, capable of displaying the full advantages of this system, for it is probably true this type of motor is the best compromise between steadiness of operation and simplicity that has yet been attained.

It would not be strange to see the double cylinder side by side motor selected as the common type for engine in front models which are intended for the ordinary use of the average user, but it is open to argument whether or not this class of users will wish for their engines in front at all. The question has been asked whether the added complexity of a three or four cylinder en-

gine placed in front would not go far to neutralize the advantage due to its greater degree of accessibility, as compared with the double opposed horizontal motor, which would have practically equal flexibility and steadiness, and it will be interesting to see how this question is to be answered.

Perhaps the manufacturers know just how much energy they are losing, if any, in the system of bevel gears necessitated by the engine in front. Placing the motive power as far as possible from its work is not an axiom of mechanical engineering by any means.

ACCESSIBILITY.

One who has real faith in the ultimate practical perfectability of the gasoline engine will not be surprised to see considerations of accessibility dwindle in importance as the need for this quality approaches a minimum. Certainly one may view with regret any mechanical sacrifices involving loss of power or personal discomfort, which are made in order to secure an accessibility which will be little demanded if simple motors are adopted and the details conscientiously worked out. I am not speaking here of machines of excessive speed and power. It makes very little difference to humanity how many cylinders they have or where they are put, but I have in mind the ordinary man's automobile, which will outnumber the other 1,000 to 1.

It would be pleasant to see a vehicle with multiple motor in front, the motive power of which could be slowed down when the car is at rest to the degree accomplished by the American designed vehicles to which I have alluded. Thus far this has not been met with—very much to the contrary. The results which have been accomplished by certain American builders in the direction of slow speed operation of the motor, without recourse to any governor but merely to throttling of a motor having an adequate balance wheel, are very remarkable. At a very short distance from some of these cars it is impossible to tell, either by the sound or the vibration, whether the motor has been started or not. No results approaching this have ever been noticed in connection with the vertical motors used upon the Continental type of vehicles.

These vertical multiple cylinder motors are supposed to furnish quite a uniform torque, and, on this supposition, the balance wheels have, in many instances, been skimped in weight and, still worse, in diameter, with the result that these engines possess but a small amount of stored energy and do not have the reserve of power needful to enable them to overcome short overloads such as brief but abrupt grades and the starting of the vehicle from a state of rest.

Four cylinder motors require very little flywheel capacity to smooth out the torque irregularities to a practical point, but they need an amount far in excess of this if they are to be fitted to start the vehicle without being speeded excessively before the clutch is thrown, and if they are to be free from the necessity of a change of gear upon each little knoll which is encountered.

General as is the acclaim in favor of the universal adoption of the multiple cylinder vertical motor placed in front and driving the vehicle through bevel gears, there is probably a conservative minority who regret the "passing" of the horizontal single and double opposed motors of low speed and carrying large values of stored energy, which are placed close to their work and attached directly to it when on the running speed.

There may indeed be a few hardened skeptics who do not even believe in the reality of the revolution, at least as it appertains to the ordinary man's automobile.

OTHER TENDENCIES.

While engine position is the one burning question brought up by this test, it is evident that progress in automobile construction is shaping itself in other directions quite satisfactorily. The suspension wheel is fast becoming a rarity among all but the very lightest rigs; short, inflexible running gears are fast being discarded; body design is being rapidly developed as a fine art, and countless details are being worked out.

It will be interesting to see whether a reaction will take place from the jump spark method of ignition to the contact spark. A number of the machines in this run were equipped with the latter system and proved very reliable. There is undoubtedly quite a widespread dissatisfaction at the weaknesses of the jump spark method and at the defects in commercial jump spark apparatus. Practical methods of varying the time of the contact spark have been developed and the dynamo is somewhat more easily adapted to this system than to the high tension method. It would not be surprising if this run should have important results in crystallizing opinion upon this important subject.

Impressions of the 500 Mile Endurance Run.

By Henry W. Struss.

When reading the description of the British Reliability Run it occurred to me that it would be desirable to make a daily change of the observers of each car, and observation in the run just held convinces me that it should be done in future long distance runs, even if only to obviate the possibility of elastic interpretations of the rules by operators and observers. Then the chance of riding on six different cars would be an agreeable experience to the observers, which would be of public benefit if they happened to represent the press.

There was one steam wagon with comparatively large wheels and small tires, and it was quite noticeable how much less dust the wheels whirred up than their smaller fellows with large tires.

CHAINS.

As a mechanical proposition it long ago appealed to me that the proper chain for automobiles was the plain or roller chain and not the block chain, as with the former there are twice as many teeth, which means not only longer life for the sprocket wheels, but the chain is less likely to run off when somewhat slack. Still quite a number of manufacturers continue using the block chain. Chains stretch or wear so fast, exposed as they are at present to accumulations of dust and sand which act as so much emery powder on the rivets that the distance rods require constant adjustment. Evidently chains should be thoroughly encased, which is easily enough done when they are on the outside. In an instance coming under my observation a steam wagon of a prominent make had been run only about 1,000 miles on Long Island, when the chain was so lengthened and the sprockets so short and thin from wear that if the chain was not drawn absolutely tight it would slide right along over the teeth of the large sprocket wheel.

THE COIL QUESTION.

I noticed that most of the multiple cylinder cars used a separate coil for each cylinder, which is not necessary, as one coil will easily answer for four cylinders, provided it has a sensitive vibrator. With only one coil it is necessary to use a commutator, but with proper insulation this is not as bad as taking care of four separate contact breakers. Using separate coils for each cylinder is, however, not as bad a practice as having a separate vaporizer for each cylinder, as one will answer perfectly for up to four cylinders; yet some makers still employ a separate vaporizer for each cylinder. Just so many more parts to adjust, look after and have trouble with. I noticed that quite a number of cars required more or less constant adjustment of their vaporizers. Why not use one so constructed as not to require this and that is self adjusting according to speed of the motor?

The lighter powered foreign cars seemed to require constant shifting of the gears for quite slight variations in the grade, and no doubt they are geared too high and their advertised economy of fuel is all based on runs made at top speed on level roads.

NOISY GEARS.

I cannot understand the noisy grinding of the gears on the cars employing sliding gears whenever they change from one speed to another. I know from experience that if the clutch is fully disengaged and all bearings are in proper shape the gears will slide into mesh almost noiselessly, and with exposed gears at that, while the cars in the run all have enclosing cases. I had always been under the impression that the gear shifting levers of the imported cars were interlocked with the clutch, but I find on inquiry that such is not the case in the majority of makes. It should be impossible to shift the gears until the clutch is perfectly free if shifting gears are to remain in deserved favor.

Whenever I have had an opporunity to look into the gear cases of foreign and some American cars I have been struck

ıe apparent narrowness of face of ırs, totally inadequate to the service ains to which they are subjected.

ems to me that the American man- ers could do better than blindly ıe conical clutch, as they seem to ıg along with other features of the in front design.

: manufacturers and importers seem ık that vibration is of no conse- , and the way their single and cylinder motors rack their vehicles ıtion.

ı the buying public becomes more inating they will prefer wagons, ıiet running motors, like all the two d cylinder ones. Naturally the nd four cylinder cars also run with ibration, as all three styles of en- ıre balanced both mechanically and npulses.

s amused to find the operator of a ; car cleaning his contact points e some grease interfered with the ı, having only the day before seen ıother gasoline wagon had the con- ›ints right inside the enclosed crank nd all covered with oil.

NARROW SEATS.

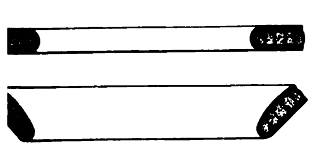
le the light gasoline runabouts ėd themselves well, considering the to which they were put, I think ıust be rather uncomfortable to ride long stretches on account of their ' seats, which are hardly equal to ; two fair sized men.

as pleasing to notice one make of wagon break away from the con- ıal form and, discarding the reach, atform springs. Platform springs find more extended use, as they easier riding than the semi-elliptic t taking the height required by the iptic.

osite Washers and Gaskets.

By Hugh D. Meier.

line cut which accompanies this de- ›n is an illustration of a composite of a type not unknown to the in- The washer proper is an annealed copper stamping, which has been over, as shown in the upper sketch. ain a washer that is not as hard as alone would be, asbestos is wound the metal, as illustrated. It then



ɛs necessary to place the washer in and give it a blow to clamp the ɪs.

lower sketch shows a washer which ɛn stamped into a frustum for use Mosler sparking plug. In this case sher must have this shape to match the peculiarly shaped porcelains of the plug.

In France gaskets made in this way have been in extensive use as packing members between the cages of inlet valves and their seats. Usually stamped asbestos washers are placed in the annular groove of the metal. This is not as satisfactory as wick asbestos, because the stamped sheet asbestos washer is likely to be torn out. It may be questioned whether a composite gasket of this type is better than a plain sheet copper gasket for use in the joints between cylinder heads and cylinders, or, in fact, in any case where a joint is to be packed between metal parts. This is true of the cage joint mentioned above, as well. Where a gas tight joint is to be made between a material that is readily fractured, such as porcelain, and a metal plug it is desirable to have a washer that has more "give" to it than metal alone has. Asbestos makes a satisfactory packing, but must invariably be renewed once it has been removed. The composite washer made of wick asbestos and copper is practically indestructible, and should outlast any engine or machine. It seems as though it were destined to find a permanent place in spark plugs using porcelain insulators.

BEGINNERS PAGE.

Fuel Regulation with Flash Boilers.

Fuel regulation dependent upon the boiler pressure is not practicable with flash boilers, and the previously described diaphragm regulator is therefore used with fire and water tube boilers only. The reason for this is as follows: Suppose that while the burner is working at full blast the carriage is stopped. This stops the feed pump and therewith the feed, and as there is practically no water in the flash boiler, only the temperature of the steam in the boiler will rise, and not its pressure, as explained in the article on the properties of steam. It would therefore be not at all certain that the diaphragm fire regulator would shut off the gasoline in such a case, and the fire might keep on burning, wasting the fuel and destroying the generator. It will thus be seen that the principle of the diaphragm regulator is incorrect when the device is considered for flash boiler regulation, for the fuel certainly ought to be shut off when no steam is needed and the generator is at the normal temperature.

Two different methods are employed for regulating the fire in flash boiler carriages, based on entirely different principles. It was shown above that when the circulation through the boiler ceases and the fire continues to burn the temperature of the steam begins to rise. The fuel feed can therefore be properly controlled by a thermostatic device depending upon the temperature of the steam. Such a thermostatic regulator is shown in Fig. 1.

THE THERMOSTATIC REGULATOR.

This regulator consists of a tube A extending across the combustion chamber and through which the steam is led on its way from the boiler to the engine. Within this tube is a smaller diameter tube B of copper, anchored at one end and free at the other and containing an iron rod C fastened to the copper tube at the latter's free end. The other end of the iron rod bears against a bell crank D which, as it moves around its pivot, raises the valve rod E, which has a valve seat close to the vapor nozzle F. The gasoline enters the regulator at G, flows first past the hand controlled needle H, then past the automatic valve E and out of the vapor nozzle F.

Copper has a higher coefficient of expansion than iron, and hence when the temperature of the steam rises the copper tube B expands more than the iron rod C, the end of the latter bearing against the bell crank D slightly recedes, the valve rod E descends and cuts off the fuel feed. The device can be adjusted to cut off for any desired temperature by means of the regulating nuts I and J.

PROPORTIONATE WATER AND FUEL FEED.

Another flash boiler fuel controller is based upon the theory that the fuel required by the burner is in direct proportion to the steam generated—i. e., to the amount of water fed, and that all that is required is to maintain a strict proportionality between water and fuel feeds. This object is accomplished by pumping the fuel to the burner directly and by operating the plungers of fuel and water pumps from the same rocking arm, as shown in Fig. 2. In this drawing, A is the fuel pump, of the plunger variety, and B the water feed pump, similar in construction, but, of

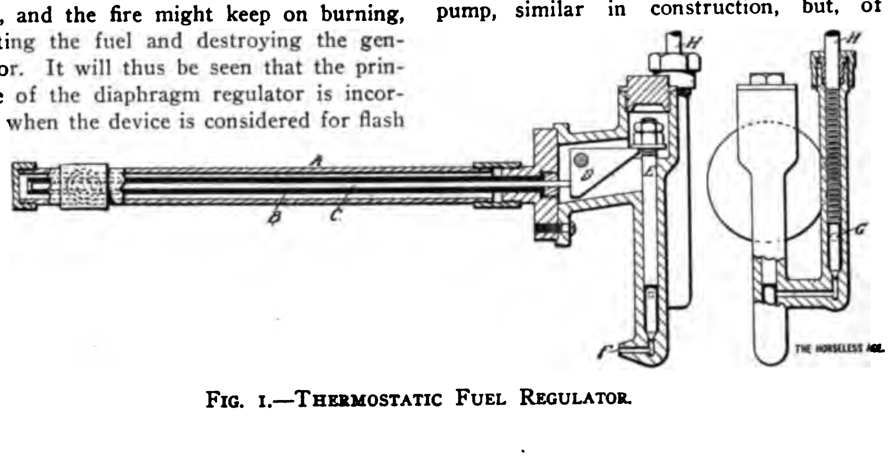


Fig. 1.—Thermostatic Fuel Regulator.

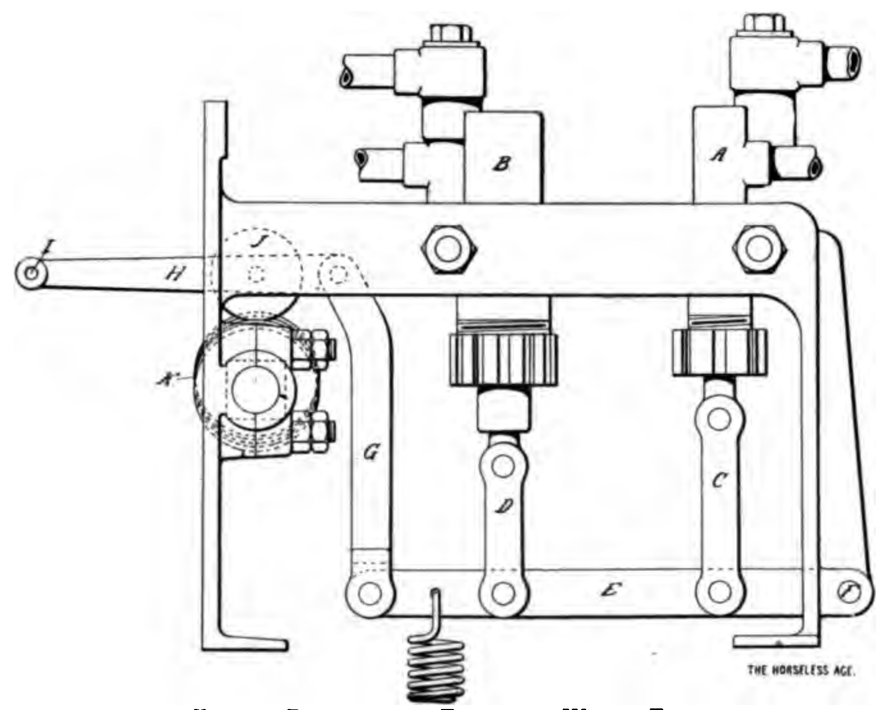


FIG. 2.—PROPORTIONAL FUEL AND WATER FEED.

course, larger. The plungers of the two pumps are connected by links C and D, respectively, to a rocking lever E pivoted at F and connected by a link G to another rocking lever H pivoted at I. The lever H is provided with a cam roller J coacting with a stepped cam K, driven from the engine by gearing. The cam raises the levers E and H and effects the discharge stroke of the pumps, while the coiled spring L effects the return or suction stroke of the pump plungers. By shifting the cam in the direction of its axis the levers will be raised more or less at each revolution, and consequently the stroke of the pump plungers varied, but the relative displacement of the two plungers remains constant at all times.

When the vehicle is at rest no fuel is pumped to the main burner, and a pilot light is therefore also used with this burner to keep the boiler hot and to relight the main burner.

Albany Automobile Club.

At the annual meeting of the Albany Automobile Club held at its rooms on Central avenue recently the following officers were elected for the ensuing year: President, Wm. E. Milbank, M. D.; vice president, Grant Newcomb; secretary-treasurer, Chas. M. Page; board of governors, Oliver A. Quayle, Joseph B. Taylor, F. G. Robinson.

Freight Automobiles Now Plying in South America.

According to the New York *Herald* of October 24 two automobiles, one burning coal and the other petroleum, arrived at Cerro Pasco from Tambo Colorado recently. They covered 100 kilometres in thirty-six hours and carried 10 tons of cargo.

LESSONS OF THE ∴ ROAD ∴

A Year's Experience with a Steam Carriage.

BY THOMAS KITTREDGE.

My year is one of thirty-six and not fifty-two weeks, as from December 1 until April 1 I did not attempt to run my carriage, although, as we had a very mild and open winter, there were very few days when it could not have been used with comfort and satisfaction.

It is with some feeling of reserve that I write what I have to say, as my experience has been so different from that of many who have related their experiences, though not different from that of many others of whom I know, for there are numbers of people in this vicinity who have had as good results as myself.

My carriage developed no structural weakness whatever. I have no fault to find with the makers, either in their construction of the carriage or in their treatment of me. The carriage has done everything I expected of it and more. I have had no trouble with it whatever. I have had no annoyances, it has never broken down, every bolt and nut is exactly in its place, and I have never had one break or come off. In fact, my year has been one of never failing satisfaction, and I have no feeling but of admiration for my carriage, and surprise that any machine can do so well. In the whole year's use I have never had to leave my seat but once (except to oil the engine and regulate the fire, or to refill fuel or water tanks), and that was a few days ago, when a badly worn chain jumped off the sprockets and required five minutes to replace.

PURCHASED AS AN AUXILIARY.

I purchased my carriage as an auxiliary to my stable, to relieve my horses of long trips into the country, but I soon found that it was so much easier and quicker to get about with, and that I could do my day's work with so much less fatigue, that my horses have become secondary to my steam carriage, and I have used it more and more, until this last summer I have used it exclusively, having lent out two horses for their keeping, and boarded another in the country, and I have not had a horse in my stable with the exception of a little horse belonging to my daughter. I have used it morning, noon and night, through sunshine and storm, through mud and sand, over cobble stones and worn out macadam in the city, for long runs into the country over regular country roads, some good, some bad; over steep hills, through wood roads, once through a berry pasture; in fact, everywhere that I have ever taken my horses—and it has never once failed me. This accounts for my enthusiasm for the steam carriage, or my own steam carriage in particular; for I realize that all steam carriages are not alike, that in fact there are but three or four makes that can be relied upon to such an extent.

My carriage is fast, and is not only pleasing to the eye, but is a good job from the carriage builder's point of view; it is very quiet, is very easy to manage and always ready to go. The boiler is an unusually good steamer, the burner has never given me any trouble, the pump has never failed me, the engine is very quiet and smooth in its action, and I have never had any trouble with the air system.

My carriage has received only the ordinary stable care; that is to say, the same man who has taken care of my horses has taken care of my steam carriage, and he has never had any mechanical training.

MINIMUM REPAIRS.

With two exceptions, of which I shall presently speak, it has had no repairs. The different packings have been closely looked after and frequently renewed. The last three months of my year there has been required a pretty constant tightening up, to take up the wear of the bearings and prevent noise. Occasionally my fire has blown out when standing, but I have minimized this by putting "registers" in the open ends of the smokestack, and on windy days have kept them nearly closed. The blowing out of the fire while standing is no annoyance, however, as with everything hot as it is, a match immediately relights it with no more trouble than relighting a cigar. It cannot blow out when running.

Back firing has not troubled me since the first few weeks of use, as I soon learned that a good air pressure (not less than 60 pounds) is an entire preventive.

TIRES.

Tires have been a source of considerable annoyance, though not as much so as I

was led to believe. In the year's use I have had five punctures and each of these has been vulcanized. The tire on the near wheel behind has never been punctured.

I very soon learned that life was too short to stop and repair tires on the road, and have invariably run home after a puncture. On one occasion the run home was quite a long one over a pretty rough road, and that tire was somewhat rim cut, but after being fixed took its place with the others and is still doing duty. I have kept an extra tire, so that I have had no delays from punctures. My mileage for the year is 3,000.

The two instances of repairs spoken of before are a bent steering knuckle and reach and a broken eccentric strap and rod. The former I was unable to account for, as it did not occur on the road. The left forward wheel pointed off at an angle of 45 degrees from the straight forward, and the reach was also bent where it is joined by the brace from the axle. This may have been caused by a loose horse in the stable running against it in the dark. The broken eccentric strap and bent eccentric rod were caused by a loose chain jumping off the forward sprocket and wedging between the strap and engine frame. This was pure carelessness, as my man had been warning me for days that the chain was badly worn and too long; but as I was to give up the carriage in a few days to take a new one that was being built for me, I tried to get along with it for the remaining time. I was not running fast at the time, but the wedging of the chain into the engine brought us up standing, and made me feel that, had we been going very fast, we might have been thrown out. The chain was easily freed (it was not broken) and quickly replaced. I ran home without any inconvenience, and the next morning to the shop. This accident cost $8 to repair. The bent steering knuckle and rod cost $5 to repair. These are absolutely the only accidents or breaks of any kind that I have had, and both have occurred within the last few weeks.

Cylinders have been packed twice during the year, and other packings more frequently.

I have added a tank filler, generator or pilot light and a steam air pump.

An inspection of my carriage the day before yesterday showed the following condition:

PRESENT CONDITION.

Running gear and body in good condition, practically as good as new; tanks and piping are as good as new, being in perfect condition; the steam air pump is as good as when put in; the water pump attached to the crosshead, while never failing to pump sufficient water to supply the boiler, shows some evidence of wear upon the plunger. This plunger may need to be replaced before long. The cylinder oil cup is working all right at present; a few weeks ago it failed to feed sufficient oil, but the reason could not be discovered, as it seemed to be in good condition, and there was no plugging of the pipes. Boiler and burner are all right, in perfect working order, but probably need to be cleaned, as they have not been since coming from the factory. All valves and cocks are whole and as good as new, with the exception of the point of one pin valve in the air system, which has been twisted off by tightening with a wrench. The steam end of the engine is apparently all right, but at the crank shaft end there are evidences of considerable wear, and before long it may be necessary to renew the cones. The crank shaft itself shows little or no signs of wear. There has been only slight wear of the bushings. The five original tires are still in a serviceable condition, and I should think would go another 1,000 miles. One has never been punctured and is not badly worn. The others are not badly worn, except where they have been vulcanized. One of the vulcanized pieces blistered and the outer layer looks ragged, but the tire still holds air and is in daily use.

With occasional renewing of the few parts where the most wear comes, I do not see why this carriage may not be run for ten years.

MOTOR VS. HORSE.

Now I come to the most interesting part of my year's experience, and I must say the following comparison was a surprise to me. In the following table of comparison I took the expense of the three horses for the corresponding thirty-six weeks of the previous year:

Three Horses, Two Carriages and Two Harnesses.	
Feed and bedding	$219.32
Shoeing	47.59
Repairs	47.45
	$314.36

Steam Carriage.	
Fuel, 351½ gallons gasoline	$40.54
Supplies	6.44
Repairs	13.00
Repacking and taking up of wear	24.45
Tires repaired	4.25
	$88.68

The supplies have been cylinder and engine oil, waste, graphite for chain, shellac for tires, two new water glasses, four rubbers for the water glasses and alcohol for the pilot light. I have put the items of repacking and the taking up of wear by themselves, as they in no sense are repairs. No machine can be run without frequent repacking and the taking up of wear in the bearings, and these are as essential as fuel.

My carriage has been out of commission during the year just six days, for the following reasons, viz.: One half day to put on tank filler; one day and one-half to put on generator; two days to put on steam air pump; one and one-half days to mend broken eccentric strap and straighten rod, and one-half day to straighten bent steering knuckle and reach; two days for actual repairs and the other days for permanent improvements to the carriage.

After the steam pump was installed the check valves stuck badly, and twice I had to return to the shop to have these eased up. This did not take long, and they have never failed to work since that time.

After making the comparison above I was led to make the appended comparison.

RELATIVE STRAIN OF ROADS.

Having run over all kinds of roads, I have come to the conclusion that the good country road is the easiest to ride over and puts the least strain upon the machinery, and that worn out macadam, as we ordinarily find it in the outskirts of the cities and larger towns, is the most uncomfortable and takes more out of the vehicle than any other kind of road. While the brand new macadam of some of our State roads is very smooth and delightful to "scorch" upon, it gets to be monotonous after a time, and there is a decided vibration to the carriage. Sand I find but little or no impediment, but mud takes a good deal more power and uses up fuel and water pretty fast. We have almost no clay in this region, so I have had no trouble from skidding. The only sliding I have experi-

Original Cost.

One horse	$350.00
One horse	250.00
One horse	175.00
One carriage	325.00
One carriage	225.00
One harness	75.00
One harness	65.00
One street blanket	7.00
One robe	17.00
One robe	10.00
Three stable blankets	7.50
Three halters	5.00
Rain cover	3.50
Two whips	3.50
Weight and strap	3.50
	$1,522.00

Steam carriage	$950.00
Spare tire	15.00
Hamper	4.50
Water glass lamp	3.50
"Bug" generator	28.00
Tank filler	7.00
Hose	2.00
Steam air pump	41.53
	$1,051.53

enced has been an occasional side slip and a little slipping of the driving wheels.

INTERESTING INCIDENTS.

I have had no particularly interesting incidents, but will mention a few things out of the usual that have occurred. On the second day of running my carriage, and while the instructor from the store was still with me, the water pump failed to work. On investigation it was found that someone, in his anxiety to have the machinery well oiled, had filled the pump with engine oil, evidently mistaking it for an oil cup. Once in the spring, before the frost was wholly out of the ground, while running along a country road my forward wheels suddenly broke the crust, burying themselves and the forward axle in the mud. Of course, I could not go on, but finally, after working backward and forward a few inches at a time, was able to back out and proceed around the quagmire. Once I discovered that my water tank was empty, a long distance from any well or brook, with a hill in front of me and one behind. There was nothing to do but turn out the fire, take my collapsible bucket and start out in search of water. It was a hot day, and by the time I had carried enough water, a bucketful at a time, to get me over the hill and to a further source of supply, I think it was forcibly enough impressed upon my mind that it is always important to know just how much you have in your tank. Once the mirror dropped from its support and was broken on the ground, necessitating the finishing my journey (nearly 70 miles) without any mirror.

OVERCOMING WINTER DIFFICULTIES.

While I did not attempt to run my carriage through the winter, I see no reason why the steam carriage cannot be used. In fact, there are three in use not far from here, all through the season, being pushed through the deep snow and drifts with comparative ease. With a false bottom of wood or canvas, the heat can be so retained that there is no danger of freezing the pipes or gauges. One steam carriage was run through last winter (a very open one here) with only hair felt wrapped about the piping.

I should like to say a few words about the motor carriage of the future. It seems to me that steam will always hold its own, on account of the greater simplicity of construction and accessibility of its parts, its greater elasticity, and, lastly, but most important of all, its great reserve force. The objections and inconveniences of the first steam carriages are rapidly being eliminated, and with the strong construction of the present time, they, in my humble opinion, are upon a pretty firm footing with the other kinds.

With the coming into everyday use of the motor vehicle its parts must be of the strongest and simplest construction and not of too great weight. It is my impression that an extreme has been reached in the matter of weight. The present heavy vehicle comes pretty near to being unwieldy, and I think the limit of weight that can be pushed uphill has been reached.

While my engine has not failed me and has always proved sufficient for any task that I have undertaken, I feel that with rugged, every day use, we need engines a little larger and of stronger construction.

In regard to the shape of the motor carriage there is a tendency at the present time to depart as far as possible from the horse drawn vehicle. I do not see why this should be so any further than it is necessary to provide additional room for the machinery. The horse drawn vehicle of today is the result of evolution and the study of years, and has pretty nearly reached a state of perfection as fas as comfort and beauty are concerned.

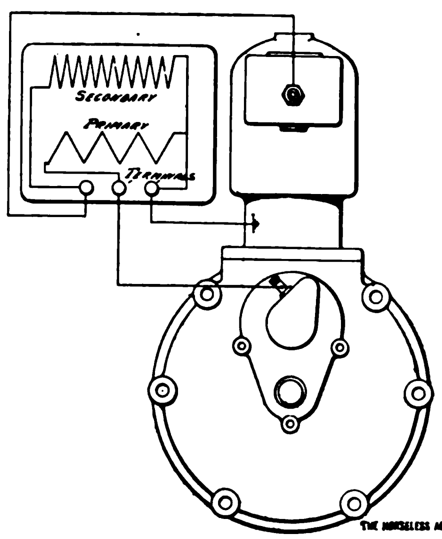
...COMMUNICATIONS...

Ignition Query.

Editor HORSELESS AGE:

Please explain in your next issue the construction and winding of a three terminal induction coil, from the starting point of wiring. I do not understand the third terminal or how it is connected to primary or secondary wires to be used on motor cycle. ERNEST G. AUSTIN.

[One end of the primary winding and one end of the secondary winding—it is immaterial which end of either—are connected together to the same binding post, and this binding post is grounded to the engine. The other end of the primary winding is connected to the trembler and the other end of the secondary winding to the plug. The arrangement is shown diagrammatically in the drawing herewith.



CONNECTION OF A THREE TERMINAL COIL.

The winding of induction coils was described in THE HORSELESS AGE of August 14, 1901.—ED.]

Fuel Queries.

Editor HORSELESS AGE:

Will you oblige a subscriber by answering the following questions:

Has acetylene gas ever been successfully applied to use on steam machines? What are its disadvantages? What is the relative cost and danger (compared with gasoline) in its use? Are burners designed for its use on the market, and where can they be procured?

How is alcohol used? How does it compare with gasoline in cost and danger? Are burners using alcohol on the market, and if so where can they be procured? Is the kerosene burner described by Joseph W. Jones in your issue of May 28 on the market yet? S.

[Acetylene gas has never been used for this purpose, as far as we know, although a United States patent was taken out about a year ago covering a steam carriage using acetylene fuel. Calcium carbide is not as generally available in country districts as is gasoline; automatic regulation of the fire would be more difficult than with gasoline and the cost would be higher. As to the relative danger, it is hard to compare the two fuels; much would depend upon the construction of the apparatus, and, on the whole, we believe, neither would have much of an advantage over the other in this respect. Since acetylene has not yet been applied to this purpose there are no special burners on the market; it could be burned in the regular gasoline burners with very slight changes. The important part to be devised would be a gas generator generating acetylene in close proportion to the varying requirements of the fire.

The only alcohol burner for steam vehicles of which we know is described in the present issue. Alcohol has less heat value than gasoline and is higher in price in this country. It is less dangerous than gasoline for the reason that it is less volatile. It could undoubtedly be burned in the regular gasoline burners for boilers by somewhat increasing the length of vaporizing pipe.

The kerosene burner described by Mr. Jones is not yet on the market.—ED.]

Penalization in Contests.

Editor HORSELESS AGE:

The remarks by Mr. Clough regarding penalization of tires and spark coils do not cover the ground properly. While it is true that manufacturers buy these articles from other people, this is not a sufficient excuse for non-penalization. If the principle advocated be applied throughout it would enable the manufacturer to dodge most of his troubles, for he not only buys his tires and spark coils and the porcelains of his spark plugs or the plug complete, but the castings used in his motor, the wheels of the vehicle, the tubing in the framing, the carriage body itself, the steel of the axles and other shafting, and so on almost without limit. As a matter of fact

all these things should be penalized. The manufacturer is responsible both for the design and workmanship of his vehicle, and if he turns out a vehicle so heavy that the tires give him trouble he should be penalized therefor, or if he uses tires so small as to be unable to properly carry the heavy load the fault is his.

The same argument applies to spark coils. There are coils guaranteed not to break down and there are coils which give much better satisfaction than others. It should therefore be the manufacturer's business to select the good ones and not dodge the responsibility to the detriment of the purchaser. If a system of sparking is so unreliable that the coils and plugs must be granted special privileges, it is time American ingenuity was adopting a better system. If stationary engines can run for weeks at a time without adjustment of their make and break system, then automobile engines should certainly be able to run a 500 mile trip without undue danger from penalization, and the plea for leniency toward the jump spark apparatus is a very strong argument against such delicate devices.

Mr. Clough's remarks regarding the tinkering required by gasoline vehicles as compared with steam are liable to create false impressions as to the two classes, for the public at large do not realize that a steam vehicle must be watched all the time, while a gasoline vehicle is only looked after when it needs attention; that is to say, a steamer has its gauges on which the engineer must keep an eye almost constantly, but the gasoline rig runs without attention until something goes wrong, when it almost invariably demands attention then and there and cannot be left until the end of the week. The advantage is with that system which requires least attention, but apparently a gas engine is most troublesome because when needing attention it usually will not wait, but must be attended to at the time. Users of both systems almost invariably pronounce in favor of the gasoline system because of the less trouble and attention, which is contrary to the impression one might form from Mr. Clough's letter.

His remarks regarding the protecting aprons hung under vehicles hit the nail on the head. If vehicles cannot cover the good roads between New York and Boston without aprons, hung under them they should certainly be a regular fixture.

The speed possibilities of the heavy gasoline touring cars on the level do not make up for their lack of ability on the hills, for the use of excesive high speed should certainly be tabooed, but the ability to travel at a fair speed, regardless of hills, is a thing much to be desired, and it is worthy of notice, as Mr. Clough states, that the heavy vehicles in many cases were not good hill climbers. Several scraps along the road indicated that the medium weight, direct driven gasoline vehicles mentioned as good hill climbers were also able to hold their own with the heavy touring cars on the level, and the public only needs to be informed of such facts as these to give their preference to the more sensible of the two—the medium weight one.

CHARLES E. DURYEA.

The Fuel and Water Consumption of B 28.

Editor HORSELESS AGE:

Although no official measurements of gasoline and water consumption of the competing vehicles were provided for by the management, the operator and official observer of the White delivery wagon, B 28, took considerable pains to obtain as nearly as possible the total consumption of supplies by this vehicle during the test. The gasoline was supplied from cans, measures and pails of various forms, which prevented any very close results, and the water was generally obtained from a hose, so that the quantity supplied could only be judged by the proportion of the tank (of known capacity) which was filled at each control. Nevertheless a fair approximation of fuel and water taken en route was doubtless obtained.

According to the best figures obtainable the amount of gasoline consumed was 44¾ gallons, and the amount of water lost to the atmosphere was 55 gallons.

This would give a mileage of 11.17 miles per gallon of gasoline and of 9.09 miles per gallon of water. A. L. CLOUGH.

Traffic Regulations.

Editor HORSELESS AGE:

Viator, looking down on us in the hazy distance from his perch in the mountain top and hearing we have a reform government, imagines our laws are enforced, so when he honors our city with his presence thinks it is lack of laws when he sees drivers ignore the plainest rights of others.

As to street crossings, it behooves those driving on the cross streets to have a care when crossing the avenues, as those driving on the avenues have the right of way. How many drivers know this?

Our laws are all right, but there is urgent necessity for their enforcement in order that the large number of drivers that are ignorant of even the simplest rules of the road be brought up with a sharp turn. The drivers of the small traders are the worst offenders, and always turn off into a side street without warning or looking back, and on several occasions I have only escaped serious damage by a hairsbreadth.

Most drivers will cut off corners, but this becomes dangerous at such crossings as Third avenue and Forty-second street; still the policemen make no attempts to stop the practice.

Repeatedly I have seen traders' wagons standing out at an angle into the street on Columbus, Third and Eighth avenues, compelling others to drive under the L road to get around them. One driver deliberately stopped a large and heavy truck near the corner of Forty-second street on Third avenue, about half way between the L posts and the curb, and went in to get some lunch, causing a block at times and inconvenience to every driver that came along. Of course, there was no policeman around to give him a lesson, so I waited till he came back. When he did I gave him a quiet but determined laying out and asked if it would have been so much trouble to move on 10 feet further and to the curb, so as to give others a chance. At first resentful, he soon acknowledged I was right, and he will probably not do it again; but imagine the dense stupidity involved. It is a wonder that there are not more accidents.

Talk of licensing drivers of automobiles! In the very nature of things they are likely to be careful observers of the laws. No, but hired drivers of horse vehicles should be compelled to pass an examination.

ST. RUSS.

Posting Up to Purchase Next Spring.

Editor HORSELESS AGE:

I have been taking your magazine for about ten months, and consider it the best one I take, among four others, and I expect to continue so long as you keep it up to the present standard. As one of your subscribers I want to stand by you in the policy you have taken in regard to reporting accidents, as I think it should be done, just as you do, except that I would like to know the make of the machines. A machine that has poor mechanism should be known, and the ones that are all right should have credit for their good qualities. I am not the owner of an automobile, but expect to buy one next spring, when the season opens. Your magazine gives me more information than any one I take, and I would hate to do without it. It costs more than others, but I know it is worth the difference in price.

I am very much puzzled to know what kind of power to use, and when I can decide which is the best for our rough roads, I expect to buy, and I am going to buy some make certain about March next. Your articles on the steam carriage burners have been very interesting to me, as I am partial to the steam machine for our roads, and think I will buy the steam machine; but it seems that if steam were the best there would be more used and manufactured. It is a hard question to decide.

Hoping your magazine will always keep up to the present standard,

C. A. HUNT, JR.

Robin Damon's Troubles.

Editor HORSELESS AGE:

Although I was not fortunate enough to be an official observer in the recent run from New York to Boston and return, I did have a little experience in connection with the trial. I was asked to be in Boston the Saturday afternoon the vehicles reached that city, and I made preparations to com-

ply with the request. With a friend who has the automobile fever in bad shape, I left Salem at 3:30 for the 15 mile run to Boston. After going a mile the engine commenced to race, while the carriage slowed down and finally stopped. Slight investigation showed that the chain was gone. The passenger walked back through the dust and up a hill until he found the chain. Part of a link was missing, and investigation of the tool box disclosed the unwelcome fact that although extra links were there no tools were in sight, because a careless machinist working in the stable had used them while making repairs and neglected to return them. Fortunately a friend came along in a steam machine, and he took my passenger to the stable, where the tools were recovered, but even with the repair oufit it was not a pleasant or easy job to get the chain together, as there is little room to work while setting up the rivets. It took ninety minutes to complete the work, but we concluded that as we had started for Boston we would keep on, and we made the trip in short order until within a mile of Park square, when the carriage stopped while running on the slow speed. I had palpitation of the heart badly for a second, for I supposed the chain was off again. The passenger was up to his job, for he climbed down at once and walked rapidly back over our course, hunting for the chain in the mud. After he had left I investigated and found the chain in place. Then I examined the gear case, and there I found that a pinion had slipped off the end of the shaft, so that the low speed, reverse and brake were out of commission. I sent a small boy on the trail of the passenger, and then put the gear back in place. There was a key to hold it, but a screw that held the key was missing. It was raining, and as we did not want to work in the wet we concluded to risk the gear, and started for Boston, which we reached in a few minutes. While running into the doorway of the Harvard automobile station the gear slipped off again. Then it was fastened on properly with a screw, so that it could not slip off again. When repairs were completed we looked into the enclosure where the touring automobiles were stored, and after concluding that few of them had more dirt on their hands and clothing than we carried, we went to a hotel, where we could wash properly and also get dinner. I had suggested running home without stopping for dinner, but my passenger is a man with much automobile experience, and he protested that we should eat when we had the chance, for no one could tell when we would get another opportunity. Alas and alack! and alack! again. He was a true prophet. Anyway, we had a substantial meal and started off in good shape, although a steady drizzling rain was falling. All went well for six miles, when the carriage stopped while the engine raced. It was the chain off again. The passenger again started on a chain hunt, and he found it with the parted link and rivet, so that it seemed like a short job to make repairs. Yet the links were bent out of shape, so that it required an hour to get the chain on the sprockets, for the rivet was hardened steel, and the space for pounding was very short. The rain was falling pretty fast, and we had landed in a puddle. The passenger wore low shoes, so he was soon afloat below the ankles. He stuck nobly to the work, however, even lying on his back to pass the chain up through the rigging, regardless of the mud and water that was soaking through his clothing. When the chain was in place I tried to start the engine, but it would not revolve with its own power. And the rain was then very wet. It required nearly half an hour to find out that the gasoline valve was choked with mud, which was dislodged by blowing vigorously into the tank. Then the wheels revolved and we started homeward, the hour being 11:30. The roads were covered with mud, but we made good time in spite of the conditions, the only mishap we encountered being the extinguishment of the lamps, for they had been burning about five hours. And when we reached the city limits we ran into darkness, for some sort of an accident had shut off the electric lights. Yet we reached home.

Another Salem automobilist who went up to see the tourists enter Boston did see them, but his observations were taken while he was on his back under his machine, which was stalled on Beacon street with the chain twisted into knots. He spent a couple of hours in that position.

I did not take quite so much interest in the contestants from New York after my own experiences in the mud and rain as I might have if I had not met with such hard luck on my own trip.

ROBIN DAMON.

The Official Observer Question.

PATERSON, N. J., October 25.

Editor HORSELESS AGE:

In automobile contests of all sorts, and particularly in such events as the recent 500 mile Reliability Contest of the A. C. A., there is no doubt that the official observer plays the most important part, for it is on his testimony solely and exclusively that the final results are completed and the club's awards made.

The desertion of a dozen or more observers at Boston, which at least temporarily embarrassed and worried the club members having the run in charge, should prove a lesson to all concerned in the management of these events and one by which they will profit.

It should be the endeavor of the club to avoid the selection as observers of the "kid gloved boobies" who go on the run "solely and exclusively" for the fun there is in it or for the purpose of being able to boast to their lady friends that they rode in a machine, or more often perchance with the hope that they may be photographed in the carriage to which they are assigned, so get their pictures in the paper.

Dressed up in impossible autom clothing, they sit in the machines and the girls in every town with a sort "king of all I survey expression," then at the first sign of a bad road rainy day they suddenly discover that have a most pressing engagement t tend a pink tea or a fudge making p which positively cannot be broken, they send in their resignations and d without the slightest compunction.

There is a certain duty incumben every man who accepts the position o server to honestly and faithfully recor performances of the car on which he r and when he falls short in this he not does an injustice to the club but to e contestant in the run, for his negle note a stop, no matter how short in tion, may be the means of giving his chine a position to which it is not ent

The men operating machines in the ton-New York run were, I believe, al minded and honest. They were the put their machines through without a and when machinery breaks or adjustn caused delay the majority of them no effort to conceal the real cause of stops or the duration of them.

The observers in many cases were sl ly confused as to just what should c tute a penalized stop, and a numb them could be heard at different time cussing whether it would be count stop if in climbing a hill and engag lower speed gear the machine stoppe a moment or even went back a foot before the clutch properly engaged.

In an argument one night I had that this should be entered in the ob er's book, even though the club di penalize it as a stop, and a numb those present disagreed with me, so cided to ask Secretary Butler abou matter. In reply to my question o subject he said that the club did not e observers to seek out trivialities b view the run on a businesslike basis a use their own best judgment as to should and should not be consider stop.

Beyond this he gave me no satisfa as our conversation was interrupted b arrival of some person desiring to see and I was never able to get a chan broach the subject to him again.

With twenty contestants holding claim to the president's cup the impor of the official observer's observations be readily realized for the failure o part to note one stop of even a sec duration would make or destroy the of his car.

It is apparent, then, that the obs should be a man uninterested in the result in anything but a general way. should also be a man who knows s thing about automobiles and automob in order that he may intelligently r

sees and what actually occurs to ıine.

bvious that an observer who does w a spark plug from a Stillson s of no earthly use either to the o the public in general, except as ıent, and there are too many such ıments in the automobile industry

opinion the men most fit to act vers on runs of any sort are the tatives of the press, and I believe ie who have given any thought to er will agree with me.

ot mean by this the representatives ellow journals, the penny-a-liners k to encourage racing by report- er spread heads that "Skinnum" y was the first man in each night ach morning. I refer particularly epresentatives of the automobile who give their time year in and to the description of automobiles hnically and generally, and who cially fitted to perform the work the service that is expected of an

know a break when they see one, : is more, after the run is finished ic in general can benefit by their of the happenings of whatever they may have been connected

dinary man who has money to in- ı automobile does not gain any in- n from the statement that Car 43 one stop, from no named cause, 2 was delayed two minutes in the ı. They are seeking for light, for , which is apparently the hardest automobile mechanism to secure nt. They want to know if a joint broke, or if connecting rod mmered and had to be taken up. e a right to expect a truthful, full the performance of all the ma- ıd the only way they can get it is he trade papers.

seems to be a mistaken and gen- prevalent among manufacturers ıews of breaks must not reach the They would convey the idea that nobile is a perfect creation which owned in spotless white silk may te without fear of dirt or grease. nt the public to believe that they ructing a "You push the lever and ıine does the rest" combination ats along for time unending and he repair man with its eternal ess.

llow who has bought an auto fferent from this, and he does not o tell his friends and their friends manufacturers cannot disbelieve so much as some of them would nd the sooner they get down to a businesslike consideration of such e better.

ossible to fool a man on his first possibly, if he is particularly dense, on his second, but he finally wakes up, and then, perhaps, all the manufacturers in creation cannot convince him that they are honest in their representations after that. It is this boomerang policy that has hurt the trade and will continue to hurt it. The ordinary peanut vender conducts his affairs on a better business basis than this.

The man who owns an auto and the man who intends buying one wants to know what he has to expect. Sensible persons realize that there is no machine, no matter how perfectly it has been developed, that will not give trouble or go wrong at some time. The man who owns a horse and carriage has had experience with hot boxes, broken axles, collapsed wheels and snapped shafts, and he does not expect to get an auto which will be infallible.

The delightful uncertainty is a feature of the sport, and it is to be hoped that the men who are advancing the trade's interests will realize this.

There has been a noticeable tendency in the past on the part of those planning endurance contests to slight the representatives of the automobile magazines, and the number of observers' positions allotted to them have often been curtailed in order that members of the club and friends of the contestants might be allowed to ride. The reports of these men have never resulted in the slightest particle of good to the trade or to the public, as they were made to the club alone, and the Boston incident proves that observers of this class are far from reliable.

There is not a single instance of any of the automobile journal observers having given up his work, and it is plain that the most reliable service both to the club and to the public has come from these men.

All reliability runs or other contests are for the greater part advertising schemes to call public attention to the automobile and its development, and the manufacturers should realize that when the newspaper men are forced aside to make room for the "swell Johnnies" the results to them are being curtailed and the success of their machines jeopardized.

HARRY B. HAINES.

Front Driving.

Editor HORSELESS AGE:

In looking over old files of your paper I see away back in the early days one or two autos that drive by the front wheels, but do not see any mention of such machines in later numbers. I have considered this problem for years, and I can't see why the advantages of driving the front wheels over driving the rear do not far outweigh the disadvantages. Are there any practical autos now built that way? Could you not give us information on this point or direct me to where I can obtain it? I am thinking of building myself an automobile this winter and am considering a front drive.

W. M. GUE.

[Leaving out electric vehicles, there is not a single automobile carriage with front drive now upon the market, as far as we know. If the front wheels are to be both drivers and steerers, rather complicated mechanism is required to transmit the power to the pivoted wheels; in the other case, rear steering, the objection is met with that the vehicle can only get away from alongside a curb or gutter by backing, as in order to get away from it by running forward the steering wheels would have to be turned in such direction as to run into the curb or gutter.—ED.]

No Renewal of Registration Required.

Editor HORSELESS AGE:

Will you tell me whether it is necessary to register automobiles at Albany each year? I registered over a year ago and have received no notice, as I supposed I should, when a renewal was required.

G. P. JESSUP.

[There is no need for renewal of registration, except in case you buy another vehicle. The law requires that "Every owner of an automobile shall file * * * a statement of his name and address with a brief description of the character of such vehicle. * * * Every person hereafter acquiring an automobile or motor vehicle shall within ten days after acquiring same register with the Secretary of State, as required by this section."—ED.]

"Kid Glove" Observers.

Editor HORSELESS AGE:

"Kid glove" observers is a term well used in your article on the Reliability Run. While the machines were in the garage here I watched one operator work from 7 o'clock until nearly 9 before the official observer appeared to note what repairs were being made. Although this observer may have run a car when his mechanician was with him, I doubt whether he ever blackened his hands or skinned his knuckles tightening clutches, etc. Your suggestion on changing observers is a good one. In this way the riding qualities and merits of the different machines could be compared, and the unbiased opinions of THE HORSELESS AGE experts would be a great help to the public.

ADOLF A. GEISEL.

Motor Logging Outfit Wanted.

FREMONT, N. H., October 27, 1902.

Editor HORSELESS AGE:

Can you inform us who is the best party to build us an engine for road work to team logs from lot to mill, we to use engine and trailers for the loads and the weight of the loads to be about 7 or 8 tons, besides trailers and engine?

Of course, our roads here are somewhat sandy and hilly, which would have to be taken into consideration when building the engine.

SPAULDING & FROST CO.

...OUR... FOREIGN EXCHANGES

The Serpollet Kerosene Burner.

The Serpollet flash boiler and method of regulation of fuel and boiler feed are generally well known, having been the subject of numerous descriptions in the technical press. The kerosene burner, however, which forms another distinctive feature of the Serpollet system, is little known.

It will be remembered by those who have followed the development of automobilism since its earlier days that on his original three wheeled steam vehicle Serpollet used a coke fire. The inconvenience of solid fuel later led him to adopt the Longuemare kerosene burner, which has been fully described in THE HORSELESS AGE, and still later to bring out burners of his own design for kerosene and alcohol, which are now used exclusively on his steam carriages.

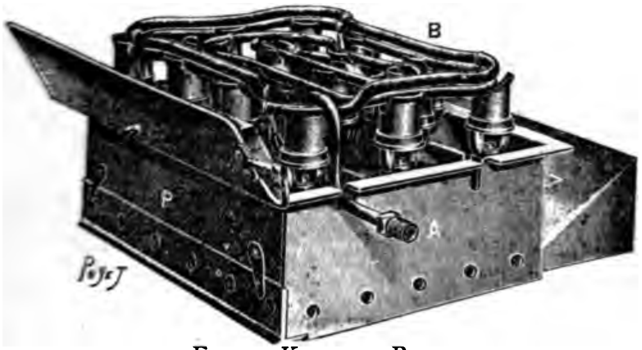


FIG. 1.—KEROSENE BURNER.

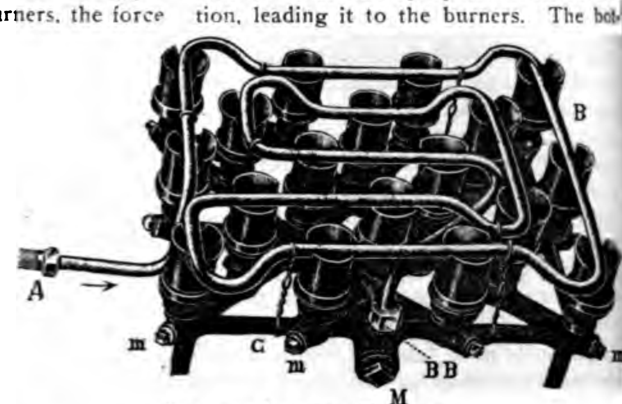


FIG. 2.—ALCOHOL BURNER.

The Serpollet burner, according to a description in *La Locomotion*, is a multiple Bunsen burner containing either twelve or eighteen separate burners. The burner nozzles are mounted upon a distributing grid, a star shaped, single piece hollow casting of bronze, the openings in the arms of the casting being closed with plugs. The piece has cast integral with it four feet, by which it is supported in a casing. At the intersections of the arms of the casting the burner nozzles are screwed into the castings, communicating with the openings therein. From Fig. 3 it will be seen that the openings in the arms of the distributer are straight, and about every 1,200 miles the plugs closing the openings must be removed and the passages cleaned of carbon deposits.

The nozzles are inserted in the star

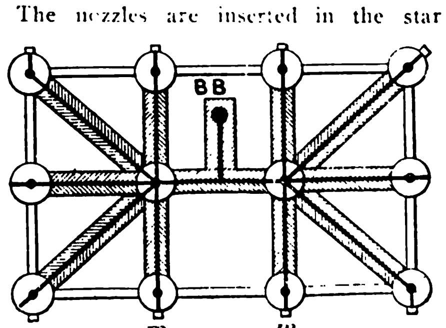


FIG. 3.—SKETCH OF DISTRIBUTER.

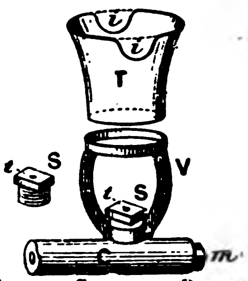


FIG. 4.—SEPARATE BURNER.

shaped casting with an asbestos gasket. The nozzle holds in place a support V, upon which is supported the induction tube T, which has notches *i i* cut in its upper edge. As in all Bunsen burners, the force with which the gas issues from the nozzle causes the flow of air into the induction tube from below, around the arms of the support V.

The vaporization of the kerosene is effected on the regenerative principle, the vaporizing tube being bent into serpentine form and arranged to rest in the notches *i i* in the induction tubes of the separate burners. The kerosene arrives at A from the supply tank; it is then cold, but in passing through the serpentine pipe it is thoroughly heated and then passes into the distributing casting through the union B B, whence it issues as a gas at the nozzles. The vaporizing pipe is held in place by the union and by stout iron wires.

The distributer casting is provided with an enlargement at M (Fig. 2) directly below the union B. Within this enlargement there is a cavity which is closed by a threaded plug containing a metal gauze filter, serving the object of retaining any carbon particles which may form in the vaporizing pipe, which would otherwise be liable to clog the vapor nozzles. This filter, illustrated in Fig. 5, consists simply of a large cotter pin G, around which is wrapped fine mesh wire gauze H. It has the form of a cylindrical plug, from the centre of which projects the loop of the cotter pin, by which the plug is withdrawn every 300 to 400 miles by means of a special hook P, carried in the tool bag, for the purpose of cleaning it. A is a pin for clearing the nozzles when choked, and R a rod for cleaning the induction tubes of soot.

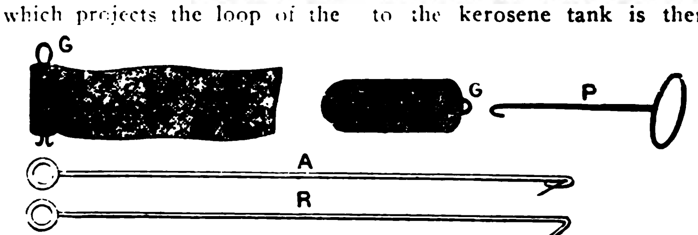


FIG. 5.—FILTER AND CLEANING TOOLS.

The burner as thus described is inclosed in a sheet iron case, which serves the various purposes of supporting the burner, of protecting it from dust and mud, of facilitating its starting and of providing proper draft.

At the front the burner case has a funnel shaped opening which admits the current of air stirred up by the vehicle's motion, leading it to the burners. The bottom of the casing is provided with a door in which there are a considerable number of openings; these openings are necessary to admit air to the burner when the carriage is at rest. This door serves to permit the cleaning of the burner chamber of the dust and dirt of the road which it collects. The burner case is provided on opposite sides with horizontal rims or edges extending outwardly, for attaching the burner case to the boiler. A downward extension of the boiler case is provided with suitable horizontal grooves, in which these rims fit and the burner case slides in position like a drawer. When the burner case is in position the door for starting the burner is closed by means of two hooks hinged on the boiler case; the connection to the kerosene tank is then made by

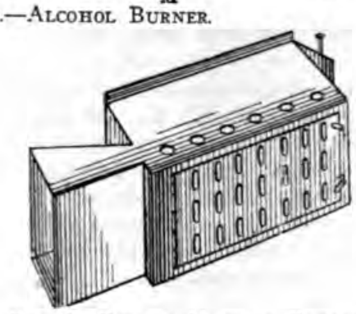


FIG. 6.—BOTTOM VIEW OF BURNER.

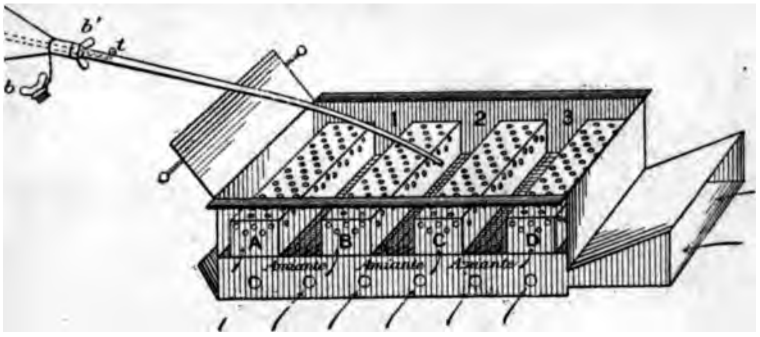


FIG. 7.—SHOWING METHOD OF STARTING BURNER.

union A and the burner is in
dition. It is thus exceedingly
ch and detach.
's a burner for kerosene and
or alcohol, the latter being
it the case. There are two
ference in the two devices.
fact that kerosene vaporizes
adily than alcohol, a double
porizing tube is employed in
burner and a single one for
urner. The induction tubes
es also have a larger open-
se of alcohol burners. The
requires less air to be pre-
with it, and the enlargement
tube results in a diminution
r suction in the tube.

TING THE BURNER.

is lighted by means of a de-
ig an oil can with long tip.
ewed to the can for conven-
ing it on the carriage. Near
end of the tip the latter is
wings *b'* for screwing it to
n the tip is unscrewed from
itter is closed by the plug *b*.
vall of the tip and to near the
can extends a fine copper
e can contains alcohol, which
the burner case and burned
inary heating of the vaporiz-

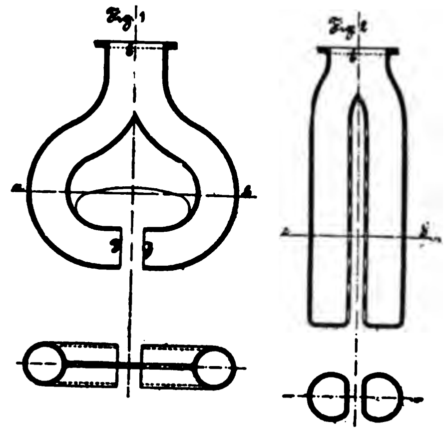
burner the door in the burn-
d the rear is opened and the
introduced to soak with al-
estos matting 1, 2, 3 on the
e case. About an ordinary
alcohol is spread over the
mats; then a lighted match
the case and the door closed.
urns slowly. At the end of
inutes the door is opened
e alcohol added by means of
the alcohol is introduced in
ity this time, owing to the
parts of the burner being al-
vaporizes almost instantly.
taken to spread the alcohol
near the door than toward
ie casing, as at the moment
e burners near the door are
s at the lowest temperature.
reason the door must be
ie alcohol is burning to pre-
ng effect of air currents.
ol must thus be added four or five times, in constantly decreasing amounts. To start the larger burners with eighteen flames is said to require about five minutes' time and three-quarters of a litre (nearly one quart) of alcohol.

When the vaporizing tube is thought to be sufficiently hot to vaporize the kerosene a little air pressure is pumped up in the supply tank by means of the hand air pump P, which is located at the right of the driver; then the starting cock D is opened, the kerosene passes through the vaporizing tube, its vapor issues from the burner nozzles and is ignited by the alcohol flame.

If the vaporizing tube has been sufficiently heated the kerosene will burn without smoke; if, on the other hand, there is much smoke on turning on the kerosene, it should be turned off again and the tube further heated by means of alcohol.

Bifurcation of the Exhaust.

The accompanying sketches illustrate a method of silencing the exhaust from gasoline motors which is said to be much used in Germany. The principle involved is that of interference of the sound waves by the juxtaposition of double discharge openings. Fig. 1 represents a discharge fitting which is fastened to the muffler by means of the flange *b*. The spent gases from the motor cylinder expand in the muffler and pass out through the fitting in which they are divided into two opposite currents of equal force which leave the fitting at the orifices F and G. The two opposed currents impinge upon each other



BIFURCATED EXHAUST.

and the sound waves produced at the edges of the orifices are destroyed by mutual interference. The noise of exhaust is thus greatly reduced.

In the apparatus is represented a different construction based upon the same principle, the exhaust here escaping through a number of openings. Two tubes of special section are arranged parallel with each other, the tube surfaces being flattened on the inner side and drilled with holes exactly opposite each other. This latter device, if made carefully, permits dispensing with the muffler altogether, the bifurcated tube being fastened directly to the exhaust valve discharge.—*La Locomotion.*

Steam Tip Wagons of the Corporation of Liverpool.

The Corporation of Liverpool, England, has now in service six steam motor tip wagons manufactured by the Lancashire Steam Motor Company, of Leyland, which are illustrated herewith.

The body of these wagons is made of oak framing, well supported with iron corner plates and tie bolts, and maple side boards and bottom. The inside dimensions are 9 feet long, 6 feet wide, 2 feet 6 inches deep. The body, which has a capacity of 4 tons, is mounted so that it can be tipped by means of a cut steel screw, working in a gun metal nut; the tipping can easily be controlled by one man from either side of the wagon.

The steam is generated in a fire tube boiler of 80 square feet heating surface, carrying steam at a working pressure of 200 pounds, the safety valve being set to 225 pounds. The boiler employs gas coke as fuel, which is fed from the top through a central shoot. An automatic feed pump is operated from the differential gear shaft; it is arranged so that any excessive water above the amount required to feed the boiler is pumped back to the tank; this is regulated by a hand wheel fixed to the driver's seat. A small steam pump under the driver's seat is used as an auxiliary feed. The fire is regulated by a hinged ash pan, and also by a lid covering the central firing shoot. The boiler is placed in front of the driver's seat, and the coke bunkers are on either side of same; these hold sufficient fuel for an ordinary day's work.

The engine is of the horizontal compound reversing type, with cylinders 3½x6¼x6 inch stroke, and running at a speed of 420 revolutions per minute. It is fitted with link motion, and has exceptionally large and long wearing surfaces. The low pressure cylinder can be worked with high pressure steam when necessary. The engine and change speed gear, along with the compensating gear, are entirely inclosed in a dust proof, oil tight casing, thus insuring perfect lubrication of all parts.

Change gear giving two different speeds is provided, the gearing being of steel throughout. The drive from the end of the

differential gear shaft is taken to the felloe of the wheel by Renold roller chains. An important feature of the vehicle is the cushion drive. It is arranged in the small pinions on the differential gear shaft, and relieves the chains and working part of the engine of the shock usually put upon them when starting a heavy load. With this arrangement the engine makes almost a revolution before the full power is exerted at the road wheel. The differential gear shaft is of special construction, being hollow from end to end; a bolt is put through this shaft which takes the end thrust caused by the bevel wheels off the bearings, thus reducing the friction considerably. The differential gear can be locked by an internal clutch arrangement, by means of a lever located under the frame of the vehicle. The water tank has a capacity of 130 gallons, and is fitted with a removable strainer, a water lifter and 30 feet of suction pipe. The under frame is constructed of channel steel.

Nine Horse Power Buchet Pacing Motor Bicycle.

The extraordinary bicycle track records which have recently been made have been the result of the introduction of more and more powerful motor pacing machines. The illustration herewith is of one of the most powerful and speedy pacing motors that have yet been built. The machine is equipped with a 9 horse power air cooled Buchet motor incorporated in the frame. Noteworthy features of the motor are the very liberal size of the intake and exhaust pipe and the fact that the exhaust is direct to the atmosphere. The drive is by belt; pedals for starting are entirely dispensed with and the seat is quite low and a back of the centre of the rear whe oil cup supplying the crank case ranged near the top of the seat p umn.

One of the handle bar grips se usual, the function of a switch fo rupting the ignition current, and a of small handles for advancing th and adjusting the carburetor are iently located on the frame tubin maximum speed is claimed to be metres (56 miles) per hour.

The Automobile Club Norma made arrangements with the Co la Foncière whereby the latter ins members of the club against accid outside parties for which the insur be held responsible.

The Automobile Club de (France) has requested all its mem case of accident to furnish an e count, detailing the causes and stances, to the club, the object b prevent incorrect and sensatio ports getting abroad.

An analysis of tire troubles in th British Reliability Contest has bee by the *Car*. Of the forty-nine car completed the 650 miles, thirty-fi through without losing a single respect of tires. Of the remainin teen, several had one trouble wi one had two failures, two had th one had five. Eight of all the were set down as punctures; the re seventeen were not specifically de The average mileage, therefore, tire troubles was 1,254; but when p only are reckoned with, the journe out at 3,981 miles per puncture, by no means bad, and consider number of cars engaged may f reckoned as a typical state of thin

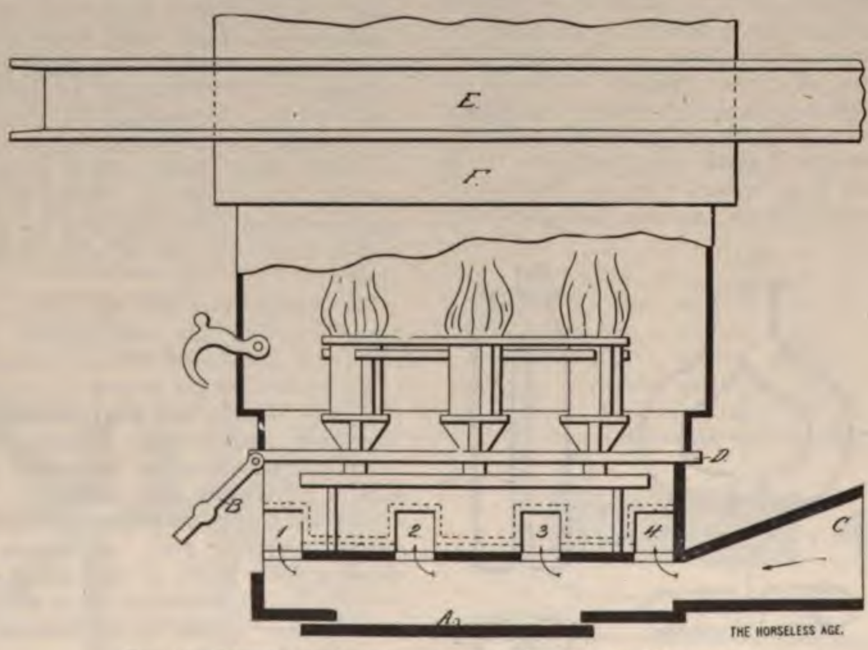
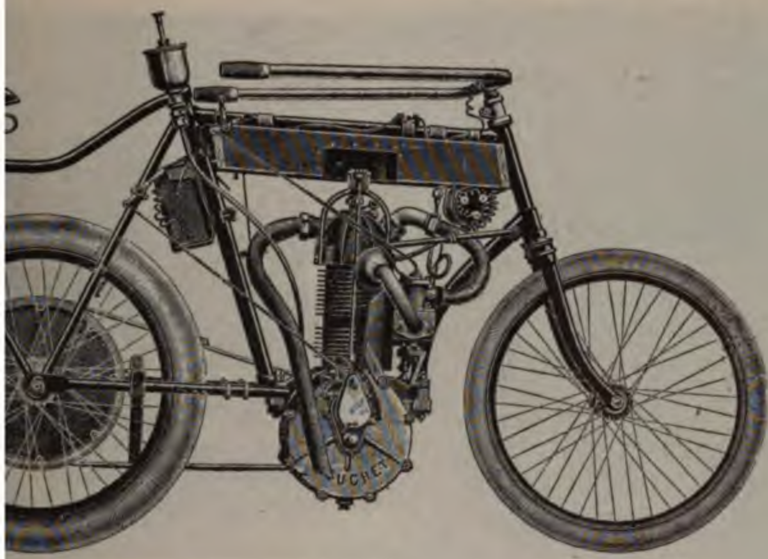


FIG. 8.—SKETCH OF ARRANGEMENT OF BURNER ON VEHICLE.
E, frame; F, boiler case; D, fastening rim; C, funnel; A, bottom door; B, starting door.



BUCHET PACING MOTOR.

rg Automobile Exhibition.

le show, under the auspices Bicycle Dealers' Association, d at the "Velodrom Roter- mburg, Germany, on Oc- events in Germany are al- th speeches, and on this oc- resses were delivered by C. lent of the association, and , mayor of Hamburg. t important German manu- some American, French and epresented. Motor bicycles in evidence. Parts and were also well represented. g of the German Bicycle iation during the show the ged to Association of Ger- d Automobile Dealers. The dard automobile wheels was d referred to a committee hree automobile manufac- e manufacturers and three er exposition in Hamburg is for next year.

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ly, there are 290 automo- g to the registration list. posed a tax of $12 on au- $24 if the vehicle carries .

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otographic display will be aris Automobile Salon in ributions are invited from ls and amateurs of inter- lating to any important Paris-Vienna, Circuit du n events of importance.

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e (England) Police Court tomobilists were recently ging from £2 to £4 and er stated that it was im- utomobile to do the speed an hour—and invited the o a journey with him and ves. He was asked if he would bring his car round next court day, and, giving his consent, the case against him was adjourned.

The British War Office is said to be investigating the ring rail tractor (gasoline system) of Keller, described in THE HORSELESS AGE of June 19, 1901.

It is stated that in the British Reliability Trials out of 3,350 marks lost by gasoline vehicles 668 (about 20 per cent.) were lost owing to trouble with the ignition.

An automobile club is being formed at Cannes, France, which proposes to further the cause of the sport by excursions and races. The address is 7 Place des Iles, Cannes.

The prefect of the Department of Seine, France, has made an allowance of 500 francs to the Fédération Nationale des Chauffeurs to meet the expenses of a congress held this year.

At horse shows horses are judged according to weight, excellence of form and performance in jumping. It is now proposed that they should further be judged according to steadiness of nerves when passing automobiles, etc.

In the German army manœuvres the present fall not less than twenty automobiles were employed for passenger transportation, motor bicycles in the dispatch service, and in the transportation of goods ten Daimler and several Thornycroft and Fowler trucks.

The hill climbing trials at Gaillon, France, organized by the organ of the A. C. F., were prohibited by the prefect of the department about a half an hour before the start. The prohibition is said to be the outcome of spite work between two rival contest organizers, *Auto-Vélo* and *Vélo*.

The Automobile Palace of the Banker Brothers Company.

Banker Brothers, agents for the Waverley electric, Daimler, Toledo and St. Louis gasoline machines, have just opened up a large station at 141 and 143 West Thirty-eighth street, New York city, in a new semi-fireproof building, which was erected for the storage and sale of automobiles. There are three floors, each of which is 37½x100 feet. In the basement vehicles will be washed, electrics will be stored and light repairs and adjustments will be made. The ground floor will be a repository and on the top floor new machines will be displayed. In the rear of the latter the office and a storeroom will be situated. An elevator will raise the carriages to this floor or place them in the basement.

For charging purposes and to illuminate the station at night a 25 horse power gas engine and dynamo will be installed. The front of the building is virtually a glass pane and in the roof there are numerous skylights.

The Chicago Show.

Arrangements have been made for the holding of the annual automobile show at Chicago, under the joint auspices of the Chicago Automobile Club and the National Association of Automobile Manufacturers, at the Coliseum, February 14 to 21 inclusive, 1903. The show will be managed, as heretofore, by Samuel A. Miles, 324 Dearborn street, Chicago. Diagrams and application blanks have been mailed to the trade, and the first allotment of space occurred on October 15. Informal application had been made for space before the diagram had been issued by at least a dozen manufacturers.

Pennington Again.

E. J. Pennington, the most notorious automobile promoter in the world, has come to light again in Racine, Wis., where he first launched his motor schemes. The Milwaukee *Sentinel* of October 19 contains a full page illustrated article on this worthy's alleged exploits in the development of the automobile. Perhaps the people of Racine and vicinity have shorter memories than others. London and New York have good cause to remember him.

New Books Received.

We have received a copy of "Notes of Military Interest for 1901," published by the War Department, Adjutant General's Office (Military Information Division); it contains a report on the British War Office's motor vehicles in 1901.

We acknowledge receipt of a copy of "Théorie des Moteurs à Gaz," by George Moreau, published by Ch. Béranger, 15 rue des Saints Pères, Paris. A review will appear later.

NEW VEHICLES AND PARTS.

The Auto-Vehicle Company's Runabout and Light Touring Car.

The photo reproduced herewith is of the first model runabout and light touring car, with detachable tonneau, of the Auto-Vehicle Company, of Los Angeles, Cal.

This machine has a double opposed cylinder engine with 4½ inches bore, 4 inches stroke and jump spark ignition by a single coil with vibrator, both plugs sparking in series. The spark is variable only for starting. The engine is controlled by a combined governor and throttle. By pressing a foot lever the throttle is opened wide, and when released it is controlled by the governor. The carburetor is of the float feed spray type. Batteries are used in starting and then the circuit is switched over to a magneto generator driven by a friction pulley of large diameter. The lubrication of the cylinders and shaft bearings is entirely by splashing in the crank case, which is fed from a sight feed cup. All gears, cams, etc., are inside of the crank case.

A sun and planet transmission gear is used, of the company's own design, the pinions having roller bearings and all parts being hardened. The brakes on the transmission gear are of hardwood and clamped against the drum by links and lever joint, springs holding the wood shoes away when not in use.

A spur differential is used with a live axle solid from wheel to wheel. A double acting band brake acting on the differential drum is operated by a foot lever, which can be locked and the rig left standing on any grade. The reverse brake on the transmisison gear can also be used when descending hills.

The transmission gear has two forward and a reverse speed, with a 3 to 1 reduction on slow speed ahead, with 6 to 1 for reverse. A 1 inch pitch by ½ inch roller chain is used.

No water tank is used, but the cooling pipes in the hood in front have 46 square feet cooling surface. The tubes are ⅝ inch in diameter, 24 gauge brass, and without flanges. Circulation is by centrifugal pump. The engine is said to develop 7 brake horse power at 600 revolutions per minute and runs up to 1,000 revolutions per minute when need. On the present machine there is a nine tooth sprocket on the engine shaft and a thirty-two tooth sprocket on the axle. The machine has 30 inch wood artillery wheels with 3 inch single tube tires, a wheel base of 72 inches and a tread of 4 feet 7 inches. The weight of machine with tonneau is 1,250 pounds.

The Auto-Vehicle Company, of Los Angeles, was incorporated under the laws of California May 5, 1902. Experimental work was carried on at a shop at 710 North Main street, but the company is now located in a new two story 60x120 brick factory at 943 North Main street, in the centre of the manufacturing district. The factory is being equipped with a complement of new tools. It is stated that the first lot of twenty-five light touring cars will be ready for market inside of ninety days, and that they are mostly spoken for by local patrons. The company will make a specialty of light delivery vehicles and build heavy touring cars to order.

New "Long Distance" Tonneau.

The First Machine of the Auto Vehicle Company.

The "Long Distance Type C" Tonneau.

The United States Long Distance Automobile Company, Jersey City, N. J., is placing a new touring car on the market known as their "Type C Machine." Heretofore the company has been building vehicles with single cylinder motors only, which were placed under the body in the rear. The new vehicle has a double cylinder, 5x6 inch vertical engine, which is placed under a sheet metal bonnet in front. The motor is rated at 12 horse power and is capable of driving the car at a speed exceeding 35 miles per hour on a good level road, it is claimed.

The wheel base of this carriage is 80 inches long and the gauge is standard. The wheels all have a diameter of 30 inches and are shod with clincher pneumatics of 3½ inches cross sectional diameter. The main frame is of angle steel and is lined with wood to increase its strength. The engine and variable speed gear are secured to a frame which is located between the sills, and is secured to and hung lower than the main frame. This machinery frame is also built up out of angle steel bars. The two working cylinders are cast integral and bolted to the crank case, which is of the inclosed type. The pistons, connecting rods and the crank pins and journals are all lubricated by splash. The axis of the crank shaft is at right angles to the axes of the axles. The cylinder heads are also cast integral, the casting being bolted to the cylinders. All the port valves are of the flat face type. The admission valves are on one side of the cylinders, and the exhaust valves are located on the other. The cams that raise the latter from their seats also actuate the admission valves. There is a cavity in each cam into which the roller of the respective rocker arm

The inlet valve is then raised by a ful spring. In case the latter ceases duty the partial vacuum in the cylin- ring the suction stroke will lift the valve. This system of mechanically lled valves might be termed "semi- e" as far as the admission valves are ned. A single carburetor is em- l to vaporize the gasoline.

change speed gear is of the planet- pe and gives three forward and a e speed. The drive is by a shaft universal joints and enclosed bevel Unlike the single cylinder ma- of this make the new vehicle has a r rear axle, which forms the casing shafts, to which the master gears of fferential are secured. The control s consist of a 44 inch steering wheel wooden rim, a lever to control all rward speeds, thumb levers to vary ixture and accelerate, a brake pedal, ersing pedal and an emergency lever. The latter applies the hub . All the brakes are double acting. vehicle, like all the others of this is controlled from the left hand f the front seat.

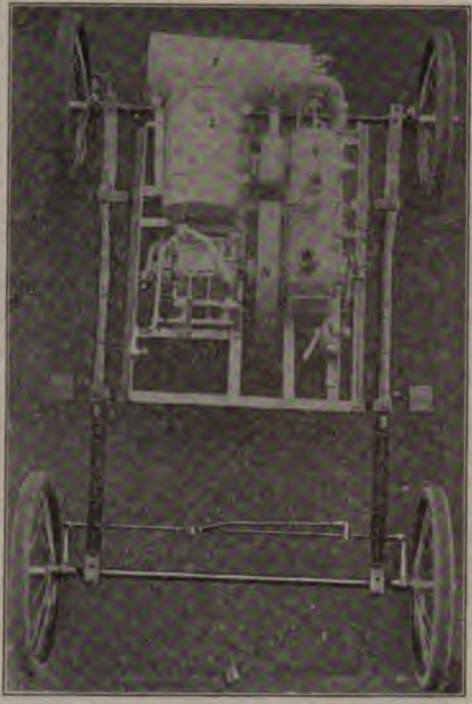
radiator is placed in front of the t and below the level of the sills. It t up out of twelve tubes (with square and header castings. The circulat- ump is of the rotary type and is by the cam shaft without chain or ntermission. The water tank is made ss and has soldered joints. It is se- to the dashboard and is hidden from y the bonnet. The capacity of the is 10 gallons. The gasoline tank 15 gallons and is located under the Ignition is by make and break and two sets (three cells each) of ior dry batteries.

seats are roomy and have tufted covered cushions. The accompany- lf tone illustrates the new car.

Woodruff Gasoline Carriage.

accompanying cut shows a top view Woodruff 1903 model with body re- . This vehicle has a four cycle, cylinder, 5¼x6 inches engine, which l to run at 1,200 revolutions per (probably at its maximum). The weighs 1,100 pounds and is said to p a speed of 18 miles an hour. wheel or side lever steering is pro- The engine has jump spark ignition ter cooling by force pump and ra-

permit effective adjustment of the without strain on the springs a rshaft is interposed between the en- haft and rear axle, a spur gear on ft being driven by a spur pinion on nk shaft and the chain running from cket on the countershaft to the et on the rear axle. The spur pin- d gear are inclosed and run in oil inclosing case swings around the haft when the distance rods are ad-



THE WOODRUFF CHASSIS.

The Woodruff Company are also building a 14 horse power tonneau with a double opposed engine. It will have sliding gear transmission, no gears running at high speed. Variable spark and throttle control are used on both machines.

By referring to the cut the different parts are indicated as follows: 1 is the muffler; 2, the gasoline tank (capacity 5 gallons); 3, the carburetor; 4, the engine; 5, the circulating pump; 6, the sun and planet transmission, two speeds ahead and one reverse; 7 and 8, chain spacers; 9 and 10, speed changing levers; 11, the flywheel; 12, the oilers; 13, the contact breaker.

New Upton Vehicles.

The delivery wagon here illustrated has been making 40 to 50 miles daily in the service of Houghton & Dutton, the Boston department store keepers, who are so well satisfied with its performance that they have ordered two more.

The company has temporarily withdrawn the delivery wagon from service for the purpose of making certain alterations upon it which have been suggested by experience.

The firm express themselves as very much pleased with the performance of this wagon, which will be restored to its regular work as soon as work is completed upon it and the two other similar vehicles which are being constructed for their use.

Houghton & Dutton appear to be firm believers in the future of mechanical traction.

The Upton Machine Company state that they are at work on a new tonneau machine which will have a four cylinder up-

THE UPTON GASOLINE DELIVERY WAGON.

right motor and a specially designed Upton gear.

The Upton Company has also in hand some auto trucks to carry 5 to 8 tons each, but for the present they are confining themselves to the tonneau and the delivery wagon. Next year they expect to follow the example of De Dion, Bouton & Co., of Paris, France, and place on the market motors, transmissions, running gears and complete vehicles.

W. G. Beale's Pope-Robinson Car.

A representative of THE HORSELESS AGE recently had the pleasure of a ride in a new tonneau touring car of W. G. Beale, of Nahant, Mass., built for him by the Pope-Robinson Company, partly after ideas of his own. The vehicle has the regular four cylinder 24 horse power engine, but a single Longuemare carburetor instead of four separate carburetors. The car is fitted with the new Robinson shifting gear transmission, giving three speeds ahead and one reverse, with a foot brake on the transmission.

The ignition is electrical and the current is furnished by a storage battery under the front seat and by a magneto running on the flywheel. The spark is advanced and the magneto and batteries are cut in and out by two switches on the top of the steering post, so that the driver can change the spark, etc., without taking his hands from the steering wheel.

The oil tank is inclosed in a light cherry box attached to the dash board and is so adjusted that all working parts are oiled from one reservoir. The tool box is very conveniently and accessibly located, being made in the shape of a French battery box and carried on the step of the car.

The car has wooden wheels of the artillery pattern and has 36 inch by 5 inch tires. The body of the car is of the popular tonneau type and can carry six persons with comfort; it has lockers under the tonneau part and carries the batteries under the front seat for sparking the motor, and also furnishes power for a small electric searchlight for night use in examining the motor and parts. The car is finished in bright English vermillion striped with coach black and is upholstered in Russia colored English pigskin, and all the lamps, horns, levers, foot pedals, hub caps and other bright parts are full silver plated. It has a canopy top with side curtains and a glass front for inclement weather.

The horns are of the popular French type, with dust screens on them, and are connected back to the front seat with flexible tubing, which is also silver plated. The lamps are of the Phare C. Billey acetylene type, with small electric bulbs in front (which can be turned on or off in coming into towns or cities), for signal lights, by a small button under the front seat.

Outside of the lamps and horns, all the equipment is of American make.

The New Decauville Light Car.

At the salesrooms of the Standard Automobile Company, 136 West Thirty-eighth street, New York, the 1903 model Decauville "light car" is now on exhibition.

Although this machine was built in a locomotive shop it does not belong to the heavy class, its weight being less than 650 kilograms (1,430 pounds). Like most vehicles of this class it has a bevel gear drive and a double cylinder vertical engine. The latter has a bore and stroke of 4⅛ inches and develops 10 horse power at its normal speed of 1,000 revolutions. The motor may be run at any speed ranging between 400 and 1,800 turns per minute. To accelerate up to the latter speed it is necessary to cut out the governor. With the engine making 1,000 revolutions per minute the car will travel at the rates of 8, 16, 25 and 35 miles per hour on a good, level road, four gear speeds being provided. The highest speed attainable is said to be 40 miles per hour. The governor is cut out, and the motor must then run at the rate of a little over 1,140 turns per minute.

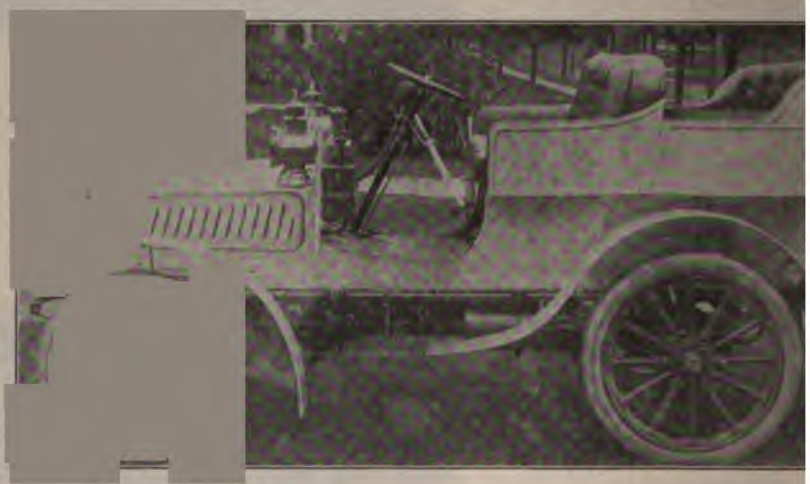
THE RUNNING GEAR.

The wheel base is 6 feet 6 inches and the gauge approximately 48½ inches. The front wheels have a diameter of 28 inches and the driving wheels of 32 inches. All of them are shod with 3½ inch Michelin pneumatics, which are, of course, clincher tires. The wheels, of wood, have 10 and 12 spokes, respectively, and artillery hubs. The bearings in the front wheels are ball bearings. The driving wheels are keyed to their shafts, which revolve in ring oiling plain bearings, i. e., where the shafts adjoin the wheels. Ball bearings are employed on both sides of the differential and as thrust bearings. The front axle is tubular, while the rear axle is built up out of the case that incloses the equalizing gears and tubular sleeves. Inside of the latter are the live shafts. The vehicle is suspended by semi-elliptic springs, whi[illegible] 32 and 36 inches long in the front [illegible] respectively. The frame is of tr[illegible]

struction and carries the bod[illegible] chinery.

THE MOTOR.

The motor cylinders are ca[illegible] with each other and also with t[illegible] The cylinders are bolted to an[illegible] crank case. The flywheel consis[illegible] portion and a clutch portion whi[illegible] to the former, owing to the fa[illegible] clutch is moved in the direction [illegible] axle to engage it. To keep out [illegible] ter the flywheel and conical clu[illegible] closed by a dust proof casing. [illegible] by jump spark with hand timin[illegible] driven dynamo, which is bolted [illegible] and is hidden by the bonnet, ge[illegible] current. To start the motor up [illegible] sary to take the current from [illegible] battery. As soon as the motor [illegible] run at normal speed an autom[illegible] cuts out the accumulator. Th[illegible] then furnishes the current an[illegible] plus goes into the battery. The [illegible]



THE NEW MODEL LIGHT DECAUVILLE CAR.

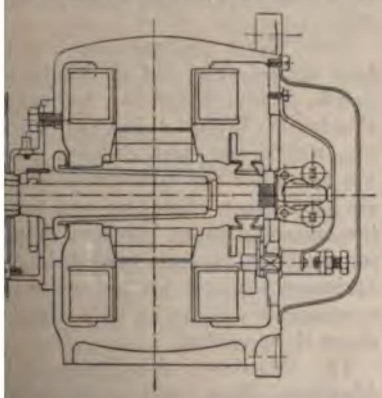
inders and heads are water cool[illegible] tary pump, which is driven o[illegible] shaft by means of a coupling, [illegible] water through the cooling sys[illegible] radiator, which is of a novel d[illegible] sists of eight vertical rows, eac[illegible] contains thirteen tubes. The [illegible] very small compared to those us[illegible] having an outside diameter o[illegible] mately one-quarter inch. The [illegible] bent to a coil and penetrate [illegible] fluted disks which are soldered [illegible] Each coil has an over all len[illegible] inches. The water tank is loc[illegible] the floor and below the tonneau. [illegible] ity is 10 gallons. To fill it it is not [illegible] to remove any cushion, a funnel [illegible] vided on the outside of the b[illegible] gasoline tank is built into the ba[illegible] front seat and hol[illegible] for [illegible] about 150 mil[illegible]

IE 10 HORSE POWER MOTOR.

pedal, an accelerator pedal, a engage the reverse gear and the rward) speed gears, an emergency ever and a lever to control the r direct drive speed. The foot dal applies the brake that acts on en shaft outside of the gear box. ke shoes of the emergency brake the drums that are bolted to the wheels. Both brakes are double All the control levers are equipped ks. The sector of the lever that on the emergency brake is not se- the body or frame, but is pivoted ever.

LUBRICATION.

cation of the cylinders, crank pins necting rods is by splash. The



OF IGNITION DYNAMO, WITH FRICTION GOVERNOR.

of the crank and gear shafts are namo ring oilers. The the supply of lubri- lashboard. It has s and a small hand ontains the two dash. Both

touching a button, provided one of the pistons is in a suitable position. It is stated that the motor can sometimes be started in this way, even when cold. The box under the main seat has a dividing wall between the space where supplies are kept and the three drawers which contain spare parts. Luggage may be carried under the tonneau seats. The fenders are of generous width and are made of laminated wood.

A car of this type which was entered in the recent English 650 mile contest scored 1,780 points out of a possible 1,800, it will be remembered. The twenty missing points were deducted for tire troubles, we are told.

The Mezger New "Soot Proof" Plug.

The Regent Automobile and Machine Company, of Brooklyn, New York, are now marketing their improved spark plug, which is illustrated elsewhere. In the plug manufactured formerly (see description in the March 12 issue of THE HORSELESS AGE) two porcelains were employed. All the parts were held together by the rod which constitutes one of the terminals. In the new plug there is but one porcelain, which is secured to the steel base by means of a knurled brass nut. The inner part of the porcelain insulator—i. e., the end exposed to the fire in the cylinder, —is cored out and of such an outside diameter as to expose but a thin annular wall to the influence of the hot gases and to the relatively cold incoming charge. The designer claims that a thin wall will not crack so readily, under the severe conditions that obtain, as a thick wall would. That portion of the porcelain which is in immediate contact with the base and projects beyond it has a very thick wall. The object in making it heavy is to prevent breakage as much as possible.

In the old plug a rod terminal of approximately three-sixteenths of an inch diameter was employed. Extensive tests have proven conclusively that it is better to turn the sparking end down to a much smaller diameter, so that that portion of the rod resembles a needle without a point. In the presence of a representative of THE HORSELESS AGE a plug with a heavy terminal rod and another with a thin one were tested. The former must have remained incandescent, because it frequently caused premature explosions when the engine (a single cylinder) was running slow. The needle shaped rod showed no such tendency. After the plug, of which it formed a part, had been in use for about ten minutes the sparking points were covered with soot by holding the plug over a gas jet for a minute. Without cleaning the plug it was put into place and the motor started up. No explosions were omitted, despite the carbon deposits, and after the motor had been running about ten minutes the plug was inspected. The sparking points were found to be bright and the porcelain appeared to be losing its carbon deposit.

In connection with the showing which the plug fitted with the needle rod made it must be said that the thin terminal cooled off very rapidly, while the heavy one remained incandescent.

The Zero Radiator.

The Zero Radiator Company, 6818 Simen street, Pittsburg, Pa., have placed a radiator on the market which is of a novel design. None of its tubes is of a round section and no radiating disks are employed. It consists of two header castings and flattened copper tubes. The latter are connected in pairs, so that the radiator is virtually a coil. There is but a quarter inch space between the tubes, one-eighth inch between the walls of a tube and the width (inside) is 4 inches. Between the headers each tube is 18 inches long. All the joints are brazed and the tubing is nickel plated. The cooling surface of a twelve tube cooler is 1,908 square inches.

The manufacturers claim that the radiator is very efficient, because the water in the tubes lies in thin sheets. It makes no difference how the radiator is hung so long as the currents of air can pass through the tubes without being deflected from their course. A steam condenser and feed water heater, of the same design, are also made by this company. The latter apparatus absorbs heat from the exhaust steam of the engine. It is claimed that a radiator with 2,000 square feet of cooling surface will not weigh more than 15 pounds.

The Salisbury Automobile Wheel.

An automobile wheel claimed to be an improvement over the well known artillery wheels is placed upon the market by the Salisbury Wheel and Manufacturing Company, of Jamestown, N. Y. The steel flanges of the hubs are made with ribs which hold the spokes in place and the wheel is claimed to be "torsion proof." The hub is made of malleable steel in two parts, which can be easily taken apart for repairs. The wood spokes at the point of entrance to the hub are made sufficiently heavy to completely fill it and are from one-eighth to one-fourth inch wider at the inner side, which makes it impossible to withdraw them unless the flanges are loosened.

The most important feature is said to be that a spoke can be taken out and replaced without removing the tire or rim. This is accomplished by simply removing the outer flange of the hub.

At a meeting of the Chambre Syndicale de l'Automobile, held at the clubhouse of the A. C. F., Paris, on October 2, reference was made to a request of the A. C. G. B. I. that steps be taken that English automobilists temporarily in Paris shall not be required to take out a permit, or require a license for their cars. The request, made on behalf of several English automobilists, is to receive the support of this association.

MINOR MENTION

H. H. Buffum, Abington, Mass., is about to move into a new factory.

Brentner & Co. are about to open an automobile station at Santa Barbara, Cal.

Worcester Automobile Station No. 1 has taken the agency for the Stevens-Duryea.

The Kratz Manufacturing Company, Springfield, Ohio, are designing a new gasoline machine.

The new gasoline carriage of the Stearns Steam Carriage Company, Syracuse, N. Y., is about completed.

Rand & Stock, Lewiston, Me., have secured the Maine agency for the steam carriages of F. E. & F. O. Stanley, Newton, Mass.

A meeting of automobilists was held recently at Atchinson, Kan., to organize for the purpose of holding an annual meet at that place.

The Tri-State Vehicle and Implement Show, to be held at Cincinnati, Ohio, November 17 to 22, has decided that no automobiles can be shown.

The American Coil Company, West Somerville, Mass., state that the first three vehicles to arrive in New York in the Reliability Run used their patent mica plug.

G. E. De Long, of the Industrial Machine Company, Syracuse, N. Y., is endeavoring to organize a new company there to manufacture automobiles and motor cycles.

Automobile enthusiasts of Warren, Mass., have formed a club. The following officers have been chosen: George W. Bennett, president, and Daniel A. Hathaway, vice president.

Fred A. Law is building a four cylinder gasoline racer for the Electric Vehicle Company, Hartford, Conn. Fifty of the same designer's two cylinder machines are also being constructed.

Dallas, Tex., now has two agencies for automobiles—the Texas Implement and Machine Company, who carry the Toledo and the Oldsmobile, and Lipscomb & Garrett, who handle the Locomobile.

A company is being capitalized at $500,000 to manufacture a complete gasoline automobile, invented, patented and built by Samuel Bouton, of Salem, Mass. The new company will also sell motors separately.

The Adams-McMurtry Company, West Fifty-ninth street, New York, agents for the Packard machines, has sold out to the Ohio Automobile Company. George B. Adams will continue as manager for the Ohio company.

Albert C. Bostwick, the prominent automobilist and member of the Automobile Club of America, who recently underwent a surgical operation for the removal of an abscess near the brain, is reported convalescing rapidly.

The Hudson County Automobile Club, Jersey City, N. J., is discussing plans for a clubhouse.

The Kirk Manufacturing Company, Toledo, Ohio, who have been carrying on experiments for two years, are about to bring out a gasoline tonneau touring car of 8 horse power, propelled by a double cylinder horizontal engine.

A. H. Funke has moved from 98 Duane street to 325 Broadway, New York. He reports that the auto motor which made such a good showing among the light machines in the Reliability Run was fitted with a Kelecom motor.

The Kansas and Missouri Automobile Association was organized at Atchison, Kan., recently with W. W. Guthrie, Jr., as president; Omar Abernathy, vice president; Dr. W. S. T. Smith, secretary, and Dr. G. L. Henderson, treasurer.

The Fisk Rubber Company, Chicopee Falls, Mass., state that six machines in the Reliability Run were equipped with Fisk single tube tires and that only one of these tires gave any trouble—a puncture, which did not necessitate a stop.

The American Automobile Company has been organized under Maine laws for the purpose of manufacturing automobiles, with $500,000 capital stock, of which nothing is paid in. The officers are: President, F. L. Dutton, of Augusta; treasurer, E. F. Whittum, of Augusta.

The Kansas City Automobile Club has decided not to oppose the automobile ordinance now before councils, but to let matters take their course. The chief objectors to the license system are said to be the local dealers, and this is not strong, inasmuch as the dealers are few.

Emil Korb and several other residents of Springfield, Ohio, have just completed an experimental gasoline machine embodying a number of new features. It is a tonneau, and is propelled by a two cycle engine located in front and having make and break ignition. Side chain drive is used.

The Bristol Motor Car Company has been incorporated at Bristol, Conn., with $10,000 capital by Frederick N. Manrose, Ernest R. Burwell and William L. Newbaur, of Bristol, and James H. Jones and Adolph A. Geisel, of Springfield, Mass., to develop and sell automobile patents.

Irvin Tennant, of Springfield, Ohio, has invented a "puncture proof" pneumatic tire. It has a strip of spring brass in the tread and sponge rubber cushions at the sides on the inside. Tests are said to have shown it very satisfactory. The sizes now made are 28 to 36x1¾ inches; 32 to 36x2 inches and 28x3 inches.

With reference to the complaint of a recent correspondent about the trouble with engine gaskets the Joseph Dixon Crucible Company informs us that flake graphite applied to the gasket will be found very useful; it insures that the gasket is always tight, and permits removal of the head without breaking the gasket.

In our issue of October 15 William V. Lowe, in speaking of noisy high speed machines, erroneously includes B 45, the Franklin entry. The Franklin machine is an exceptionally quiet one, and Mr. Lowe must have lost sight of that fact in the general din of the others. It has also a medium and not a high speed motor.

J. H. Van Dorn, E. I. Leighton, W. A. Dutton and Frank Schneider, of Cleveland, Ohio, have incorporated the Star Automobile Company with $50,000 capital. It owns the patents for an improved gasoline motor car, the invention of a local machinist named Albaugh. One of the machines has been built and successfully operated.

Frank H. A. Hoerner & Co., Dayton, Ohio, are making a gasoline engine, which they expect to have on the market by the first of the year. It is to be a double cylinder, will use jump spark ignition, have large water cooling space and will occupy only a little more space than the 6 horse power single cylinder engines in use today.

The Fournier-Searchmont Automobile Company, Philadelphia, Pa., call attention to the fact that they were the only concern entering more than one car in the recent Reliability Run that had all of them finish with a perfect score, and that they entered three cars in the two previous contests of 1902, all three in both cases having come through with perfect scores.

The General Automobile Company, Cleveland, Ohio, will show their 1903 model about the first week in November. The runabout is similar to last year's model, but is equipped with a double engine (opposed) of 8 horse power. The weight of the vehicle is 1,100 pounds. Wheel or side steering is optional with the purchaser. Owing to the change of corporation name the cars will not be known as "Cleveland" for the coming season, but as the "General."

The "Ware Automobile Station" has been opened at 36 and 38 Winthrop street, Salem, Mass., under the management of Charles W. Ware. It is a two story building, 160x60 feet, with concrete floors, and has space for the accommodation of seventy-five autos. Smoking and ladies' parlors, cleaning room, machine shop, charging facilities, etc., are provided Although carriages are now being received the arrangements will not be fully completed for about three weeks.

The Marlboro Automobile Club, of Marlboro, Mass., was organized October 20, and now numbers twenty-nine members, each of whom personally owns a vehicle. There are in addition several applications for membership. The officers of the club are as follows: President, Dr. E. G. Hoitt; vice president, Dr. J. L. Harriman; secretary and treasurer, J. F. J. Otterson; executive committee, George B. Kieth, Dr. E. H. Ellis and A. C. Lamson; consulting engineers, J. P. Wood, O. D. Wheeler and F. D. Knight.

The Detroit Races.

The oft postponed races at Grosse Pointe, Detroit, finally came off on Friday and Saturday last.

The chief interest centred in the 5 mile event for the manufacturers' challenge cup, in which B. Oldfield, of Toledo, beat Charles B. Shanks, of Cleveland, by nearly a mile in the remarkably fast time of 5m. 28s., and received an ovation from his friends. W. C. Bucknam, of the Geneva Automobile and Manufacturing Company, was third.

In the 10 mile handicap Shanks was the winner in 13m. 34 2-5s. Alexander Winton's machine broke down and J. Hedges, of New York, on a Mercedes, took second place.

A Baker electric machine was then driven over the course for an exhibition 10 miles in 20m. 28½s., covering five miles in 9m. 5 1-5s., and breaking the record, which was 10m. 28½s.

The following is the summary:

First Race—Five miles; gasoline vehicles; 5 horse power and under. Won by W. Wigle (Oldsmobile); D. B. Huss (Oldsmobile), second; J. L. McNamara (Oldsmobile), third. Time, 7m. 50s.

Second Race—Five miles; handicap; Detroit private owners. Won by W. Rockerman (Elmore); W. C. Rands (Ford), second; A. Y. Malcolmson (Winton), third. Time, 8m. 32 2-5s.

Third Race—Three miles; steam vehicles; all weights and classes. Won by W. C. Bucknam (Geneva); W. T. White (White), second; J. G. Reiner (Locomobile), third. Time, 4m. 7 2-5s.

Fourth Race—Ten mile handicap, open. Won by C. B. Shanks (Winton); J. Hedges (Mercedes), second; W. T. White (White), third. Time, 13m. 34 2-5s.

Fifth Race—Five miles, all classes; for manufacturers' challenge cup. Won by B. Oldfield, of Toledo (special); C. B. Shanks (Winton), second; W. C. Bucknam (Geneva), third. Time, 5m. 28s.

The 20 mile open and obstacle races were called off.

The Dayton Races.

The Dayton automobile races, held on Saturday, October 18, attracted a crowd of about 5,000 people. There were seventeen entries, but only eleven participated in the eight events. The first race, a 3 mile race between Oldsmobiles, was won by Ralph Owen, of Cleveland.

The second event, a 3 mile motor cycle handicap, was won by C. C. Rooney, of Dayton.

The third event, for heavy machines, was won by C. G. Fisher on a Winton.

The fourth number on the program, which was to have been a match race between Tom Cooper, of Detroit, and Barney Oldfield, of Toledo, on special machines, was not run owing to the inability of the contestants to arrive in time. A mile motor cycle race was substituted.

Frank Hilt, of Dayton, drove an exhibition mile in a Stearns for the fifth event, making it in 1m. 43s., with his machine stripped.

The next was a three heat match between C. G. Fisher and Earl Kiser, both on Wintons. Kiser won the first heat and Fisher the second. The third was not run.

The seventh event was an Australian pursuit race between Hilt (Stearns) and Graham (Winton). Graham caught Hilt in 9¾ miles in 12 m. 10s.

The final event, a 2 mile handicap open to all classes, brought out six starters. Ralph Owen (Oldsmobile), George Andress (Oldsmobile) and F. Bierce (Mobile), were given one minute handicap. Hilt and Kiser got 10 yards, with Fisher at scratch. Hilt won, with Fisher a close second, Kiser third, F. Bierce fourth, Owen fifth, Andress last. Actual time, 3m. 41 2-5s.

By this time Cooper, who had arrived meantime, brought out his racing machine and made several rounds at the rate of 1m. 34s. per mile. It was then announced that he would go a mile against time. He had scarcely got started when the big machine went wrong and he had to give up the attempt.

The Chicago Club Races.

The Winton "Pup" carried off the honors at the races of the Chicago Automobile Club, which took place Friday and Saturday, October 17 and 18, at the Harlem track. The following is the summary of the second day:

Five Miles, Gasoline, 0:35 to 0:50 Class—Oldsmobile (D. B. Huss), first; Oldsmobile (J. B. Burdett), second; Friedman (B. M. Young), third. Time, 11m. 13 2-5s.

Twenty-five Miles, Open, All Makes, Weights and Classes—Winton (C. B. Shanks), first; Winton (John E. Fry), second; Winton (F. X. Mudd), third. Time, 39m. 38s.

Five Miles, Steam—Locomobile (Sykes), first; Hagaman & Hammerly (Dr. L. W. Sheppard), second. Time, 8m. 4s.

Five Miles, Handicap—Auto-car (Dr. F. C. Green), scratch, first; Oldsmobile (J. E. Stevens), 3 minutes, second; Oldsmobile (J. B. Burdett), 30 seconds, third. Time, 9m. 48s.

Five Miles, Invitation Handicap—Oldsmobile (D. B. Huss), 5m. 30s., first; Oldsmobile (J. B. Burdett), 4 minutes, second; Winton (J. E. Fry), 1m. 15s., third. Time, 6m. 25s.

Automobile Accidents.

The burning of an automobile through the carelessness of a man who was repairing it is reported from Cairo, Ill.

Two residents of Rockford, Ill., lost control of an automobile they were driving near there and were thrown into the ditch, the machine landing on top of them.

A collision between a horse and buggy and a fast automobile is reported from Newton, Mass. The cause seems to have been the auto's turning a corner at too high speed.

An automobile overturned in Grant boulevard, Pittsburg, recently, and seriously injured one of the three occupants.

At Jersey Shore, Pa., an automobile dashed down a 25 foot embankment on the Susquehanna River, but the two occupants escaped injury.

In going up hill at McComb, Miss., recently, the engine of a steam machine reversed, and the machine ran down hill violently into a ditch, injuring the occupants.

An automobile driven by Andrew Kenan, of Cincinnati, Ohio, was upset the other day, owing to the operator's losing control of the steering lever while turning out for a carriage.

Frank A. Elwell, a well known motor cyclist of New York, met his death on Sunday while riding a motor cycle on Long Island. A broken fork is given as the cause of the accident.

Robert Gaede's big French machine skidded on the wet asphalt at Paterson, N. J., the other day, and ran up onto the sidewalk, doing some slight damage before the operator could control it.

At DuBois, Pa., recently, the brakes of a touring car failed to work on a long hill, and the machine ran away, finally crashing into a tree and hurling the occupants into the air. No one was seriously injured.

A large touring automobile collided with a trolley car on Warburton avenue, Yonkers, N. Y., Sunday, and threw the trolley off the track and over on its side, injuring a number of the passengers. The automobile and its occupants are said to have escaped with little or no injury. Inasmuch as there has been a good deal of complaint in Yonkers and vicinity about reckless driving of automobiles it is likely that the driver of the automobile will be arrested.

The light steam runabout owned by Dr. F. K. Hollister, a New York practitioner, was almost entirely destroyed by fire on October 22. The doctor, who had been using the machine daily in his practice and had covered 17,000 miles in the vehicle, had just entered the home of a patient when the accident occurred. The auxiliary air pump, which was capable of keeping the tank pressure at 100 pounds and had frequently done so, had been in use during the afternoon. The pressure in the air tank was rising above 80 pounds when the doctor relieved it. The fire was turned very low and the pressure in the air receptacle stood at 78 pounds when he entered the house. Shortly after an explosion of the tank occurred, accompanied by a report. When the attention of the owner had been called to the fire by bystanders, who rang the door bell violently, the vehicle was in flames. The woodwork was rapidly consumed and the flames were put out by the fire department. Some of the metal parts were warped and twisted, but it is believed that

the machine can be rebuilt again at a reasonable figure. What caused the gasoline to ignite is not known, since its tank appears to be intact.

A party of automobilists who were enjoying a ride at Crestline, Ohio, narrowly escaped death or serious injury through collision with an express train. The engine of the automobile stopped just as they were crossing the track, and had it not been for the timely assistance of the section gang the express would have struck the machine at high speed.

Legislative and Legal.

Several more arrests for illegal speeding are reported from Radnor Township, in the suburbs of Philadelphia.

Several small fines have been levied on automaniacs at Buffalo recently, where the speed question is now being threshed out before the city council.

C. J. Fleet, a Montreal automobilist, is suing to recover a toll gate charge of 25 cents, which he claims, according to the law, is specifically limited to horse vehicles.

Felix M. Warburg, of New York, against whom a judgment for $12,070 was recently rendered at Trenton, N. J., in favor of Joseph B. Hughes, has taken an appeal to the United States Circuit Court of Appeals in Philadelphia. He claims that the automobile that caused the damage was not his.

Dr. J. W. Masten, Denver, Col., bought an electric automobile of Dr. H. B. Bartholomew, same city, under a guarantee, paying part down and giving his note for $500 for the balance. He found the machine unsatisfactory, and refused to pay the note. A jury is trying to determine whether he ought to pay it.

Herbert A. Marble, of New York, who is awaiting trial at New Haven, Conn., for manslaughter, in having, it is alleged, caused the death of John Molz at North Haven owing to a collision between an automobile driven by Marble and a horse and buggy in which deceased was riding, has been sued for $5,000 damages by the widow.

The prosecution in the criminal case against Blum brothers, Lodi, N. J., who are charged with maintaining a nuisance by driving their automobile at reckless speed and causing the death or injury of two men at Hackensack, N. J., last spring, are finding difficulty in establishing the identity of the offenders, owing to the high speed at which the auto was moving.

Several arrests have been made for excessive speeding on Long Island roads the past week. Fines of $10 and $20 have been imposed. At Jamaica Mason Crocker, of Jersey City, was held in $1,500 bail for examination on the testimony of an officer that he was running at the rate of 50 miles an hour. He pleaded not guilty. J. D. Cooper, driver for John C. Orr, of Brooklyn, is charged with a third violation of the Cocks law, and is said to have fled to escape arrest.

A. C. A. Reliability Awards.

The committee of the Automobile Club of America had several meetings during the week and has announced the following awards:

QUALIFIED FOR THE PRESIDENT'S CUP.

C 1, Ohio Automobile Company, H. W. Whipple.

C 3, Ohio Automobile Company, Adams & McMurtry Company.

B 5, Prescott Automobile Company.

B 11, Haynes-Apperson Company.

B 24, White Sewing Machine Company, Paul H. Deming.

B 25, White Sewing Machine Company, Windsor T. White.

B 26, White Sewing Machine Company.

B 27, White Sewing Machine Company.

B 33, Grout Brothers.

B 47, Knox Automobile Company.

C 42, Fournier-Searchmont Company, H. B. Shattuck & Son.

C 67, Fournier-Searchmont Company, John Wanamaker.

C 76, Fournier-Searchmont Company, John Wanamaker.

A 63, Olds Motor Works, New York.

B 68, Fredonia Manufacturing Company.

B 70, Foster Automobile Manufacturing Company.

Inasmuch as sixteen contestants qualified for the president's cup it was decided, as proposed in our last issue, that the club should hold the cup as a perpetual trophy, the names of the sixteen winners thereof being suitably inscribed thereon.

B 30, Stevens-Duryea, Scarritt Cup.

B 48, Knox Automobile Company, Chamberlin Cup.

B 21, Darracq entered by Harold H. Brown, John A. Hill Cup.

The other awards were to have been made yesterday afternoon, but the committee meeting was postponed, owing to the illness of Mr. Scarritt.

The Mechanics' Fair Automobile Show.

As in previous years, an automobile show is being held the present fall in the Mechanics' Fair Building in Boston. The show, owing to the restrictions of the N. A. A. M., is, of course, only of local character and mostly patronized by agents. Among the exhibitors are the Crest Manufacturing Company, who exhibit a runabout, motors, spark plugs and coils; Wm. B. Hamblin, care of Crest Manufacturing Company—Hamblin patent leather auto caps; Columbus Automobile Exchange, Boston—Orient Motor bicycle, Orient runabout, Elmore, Friedman, Crestmobile and Darracq; Automobile Headquarters, Boston—Knox, Pierce, Gasmobile and St. Louis: also the Dr. Carlos C. Booth historical automobile; Pope Manufacturing Company, Boston—Columbia motor cycle, Waverley electric runabout, Toledo steam stanhope and surrey; Kenneth A. Skinner, Boston—De Dion motorette, delivery wagon and 1903 model surrey-phaeton; Locomobile Company, Boston—various types of steam locomobiles; E. H. Corson, Boston—American Coil Company's coils, Merkel Manufacturing Company's motor bicycles and Marlborough Automobile Company's steam carriage; Grout Brothers, Orange, Mass.—light runabout, runabout and victoria stanhope; Electric Vehicle Company, Hartford—Elberon victoria, 1903 model tonneau and brougham; Rambler Automobile Company, Boston—several Rambler machines, including two which competed in the recent Reliability Run; St. Louis Motor Carriage Company—St. Louis gasoline victoria, with rumble seat; Boston and Amesbury Manufacturing Company, Dorchester, Mass.—Boston model gasoline carriage; Buffalo Gasoline Motor Company—14 horse power motor in operation and 4 horse power motor.

Another Promotion Scheme.

An automobile which certainly possesses the feature of distinctiveness is projected by persons styling themselves "Motor Vehicle Designing and Development, 150 Nassau street, New York city."

This vehicle, of which a little model is exhibited, has a driving shaft mounted on a slide plate, which plate is movable laterally by the steering rod, through a sector. At each end of the driving rod is a disk, whose periphery is in contact with a pair of forward and rear wheels of the vehicle. The shaft is rotated by "any kind of a motor," through suitable gearing, and the friction wheel intermediate of the vehicle wheels is supposed to communicate power to both forward and rear wheels simultaneously. To do this, however, the forward and rear wheels are tensionally held by coil springs in contact with the frictional wheels.

While the devices may operate in a small model, under the easiest conditions, it is not difficult to imagine the result of jarring or jolting in actual practice, and of ascending grades, which would inevitably contract the springs and remove the vehicle wheels from the influence of their frictional drivers.

Further, in steering, the lateral movement of the driving shaft, and its function of deflecting all four vehicle wheels, would present great difficulties.

Nominations for A. C. A. Election.

The following nominations have been made by the nominating committee of the Automobile Club of America: Albert R. Shattuck has been renominated for the office of president; Winthrop E. Scarritt has been nominated for first vice president; James Stillman, second vice president; W. K. Vanderbilt, Jr., third vice president; Jefferson Seligman, treasurer, and John Jacob Astor, George F. Chamberlin and Peter C. Hewitt, governors for three years. The election will be held on November 17.

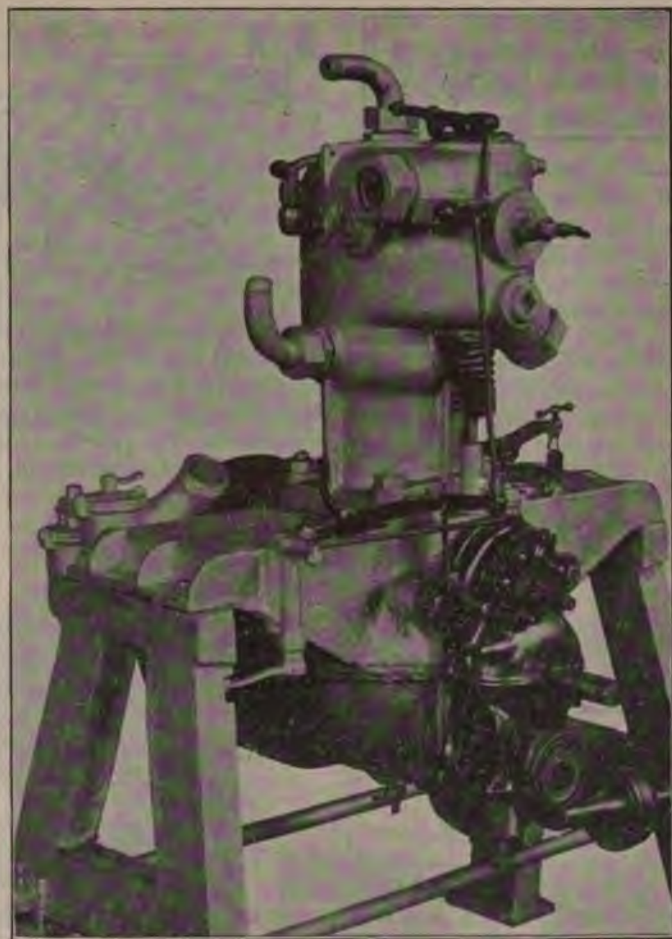
At the Castle of Chapultepec.

The photo herewith reproduced shows W. A. De Gress, resident partner at Mexico City of the firm of Mohler & De Gress, in one of the firm's gasoline machines in the grounds of the famous castle of Chapultepec. Mohler & De Gress were one of the pioneers in the automobile business, having begun their experiments seven or eight years ago, and having produced a light gasoline carriage six years ago, which was operated in the boulevards of the Mexican capital.

The La Roche Gasoline Engine for Motor Vehicles.

The F. A. La Roche Company are now placing on the market a gasoline motor for automobile and yacht work. These motors are made on similar principles to the French Darracq Company's motors, with some slight improvements and modifications. The motors are said to be made of steel throughout, no cast iron whatsoever being used. They are claimed to be extremely light in weight, yet strong and substantial, simple and accessible.

These motors are equipped with an automatic governor which is adjustable at will, so that whatever speed it is desired to run the engine at will be maintained, either running with load or without load, thereby preventing racing, when the engine is temporarily disconnected from the running gear. The ignition is by jump spark.



THE LA ROCHE ENGINE.

This motor is fitted with the well known conical clutch, which is said to have ample surface to transmit 20 horse power.

Each motor is equipped with a rotary pump, forming an integral part with it, and a straining device is provided, which prevents any foreign matter from circulating in the water system. These parts are very easy to get at. In the polished brass case, seen in front of the motor in the cut, is arranged the automatic governor, which regulates the speed of the engine. The inlet and exhaust valves can be removed very readily, and five minutes is said to be about the maxium time to remove all valves and replace them. The engine is oiled throughout by the splash system. The crank case is provided with an opening through which the condition of the crank, connecting rod and the interior parts of the engine can be inspected at any time.

The engine is self contained and complete in every detail; where used for motor cars no pump need be supplied, all that is necessary being to set the engine on the frame, connect the gasoline, the water and the driving gear. The company are as yet only delivering one size, a 9 to 10 horse power.

IN THE GROUNDS OF THE CASTLE OF CHAPULTEPEC.

The Stewart Hydrocarbon Filter.

A gasoline filtering device is being placed upon the market under the above name by W. S. Howard, of Troy, N. Y. This attachment is made of aluminum and in two sizes, for ⅛ inch and ¼ inch piping. It is said to have ample filtering surface, has a direct supply cock on top, and a removable plug in the base. The device is to be inserted in the supply pipe just ahead of the carburetor; all sediment and water collects at the bottom of the device, thus preventing clogging of the small valves, and can be removed by taking out the bottom part every few days.

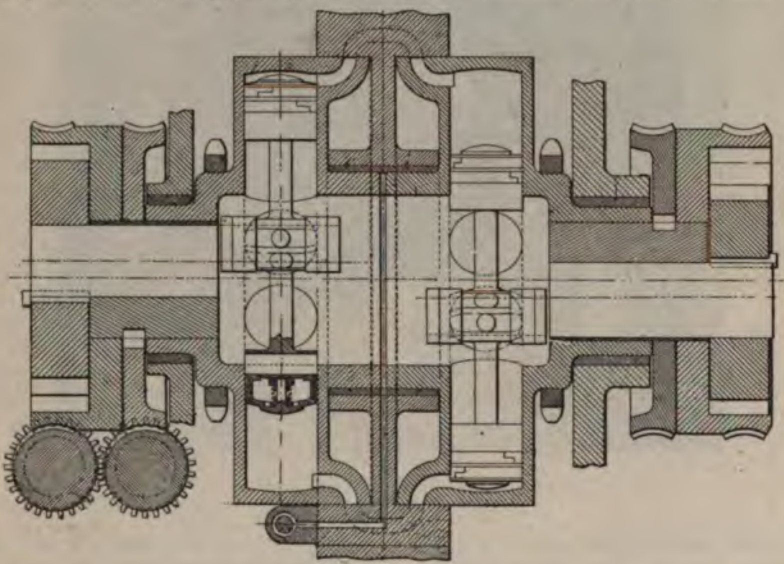
Inasmuch as the English manufacturers have decided to patronize the Crystal Palace show, which conflicts in date with the New York show at Madison Square Garden, the National Association of Automobile Manufacturers has withdrawn its circular recommending its members to exhibit at the London show.

MOTOR VEHICLE PATENTS..

United States Patents.

710,485. Variable Speed Gear.—C. M. Manly, of Washington, D. C. October 7, 1902. Filed October 29, 1901.

The invention relates to a variable speed device in which a pump and and a motor, operated by a fluid delivered from the pump, are interposed between a prime mover and a driven device. The pump is shown on the left side and consists of a plurality of radially disposed cylinders



No. 710,485.

which are revolved around a stationary crank pin. The latter is radially adjustable. The worms and worm gears provide the means for adjusting the crank pins of both the pump and the hydraulic motor. The crank pin of the latter is set at 180° to the other pin and the ports of the motor register with those of the pump. Motion is transmitted to the cylinder structure by means of a chain or by other suitable means. Power from the motor cylinders may be transmitted by the same or equivalent members.

710,486. Starting Mechanism for Prime Movers.—C. M. Manby, of Washington, D. C. October 7, 1902. Filed November 23, 1901.

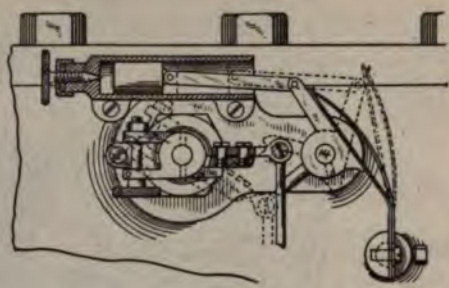
A few modifications have been made to adapt the device described above to this service.

710,769. Motor.—W. T. Fox, of Rochester, N. Y. October 7, 1902. Filed January 13, 1902.

The invention relates to valveless steam engines with piston control of the ports.

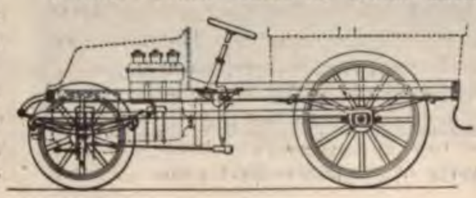
710,771. Sparking Device for Explosive Engines.—October 7, 1902. Filed April 15, 1901. Renewed April 16, 1902.

The objects of the invention are to provide the electrodes with moving or movable contact points, one of which is adapted to draw or wipe across the other in order



to draw an elongated spark, also to provide means whereby the speed of the wiping action may be varied. There are two electrodes, mounted each on a shaft that projects into the cylinder. On the shaft of the insulated electrode an arm is secured. Integral with it and its hub is a plate that is parallel with it and has a similar arm projecting from its hub. The relative position of these can be adjusted by means of a knurled thumbscrew. The latter permits the radial position of the electrode to be changed relatively to the arm with the plate. A link which is actuated by a suitable member and pivoted to a block transmits motion to a coiled spring, which causes the insulated electrode to oscillate. Secured to the shaft is a hub which has a stud and an arm extending from it. The former is raised by the block, mentioned above, and its electrode approaches the other as a result. Soon after the pin becomes disengaged and the electrode falls back to its original position under the pressure of the two flat springs. To regulate the speed of the recoil a dash pot is provided. The needle valve shown prevents the compressed air from escaping too rapidly.

710,809. • Truck Frame for Motor Cars.

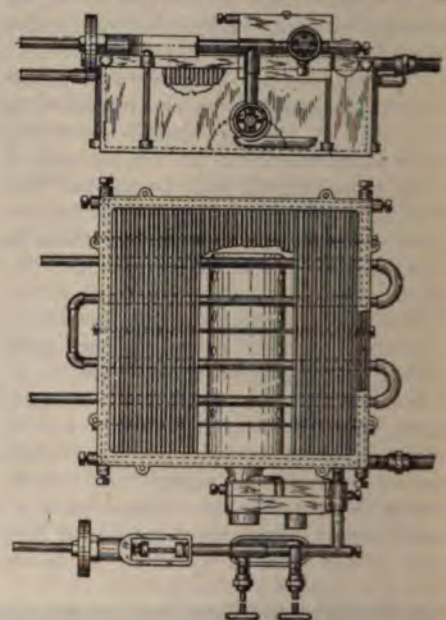


—A. Schmid, Le Havre, France. October 7, 1902. Filed January 28, 1902.

The object of the invention is to provide means for relieving the passengers in automobiles from vibration which attends the working of the motor. To that end a separate frame is provided for the motor and machinery. The former is located under a bonnet in front. The frame which carries the body is of the conventional type; whereas the machinery's frame has no springs in the rear, being fulcrumed to the rear axle, and rests on either coiled or on vehicle springs in front.

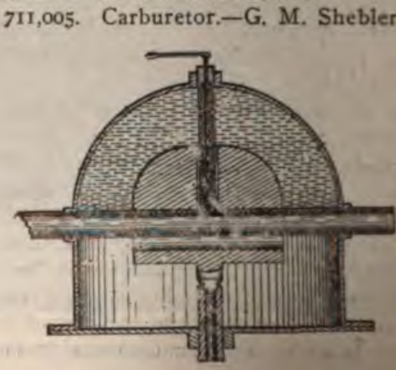
710,410. Hydrocarbon Burner.—S. Berens, of Lagrange, Ill. October 7, 1902. Filed April 14, 1902.

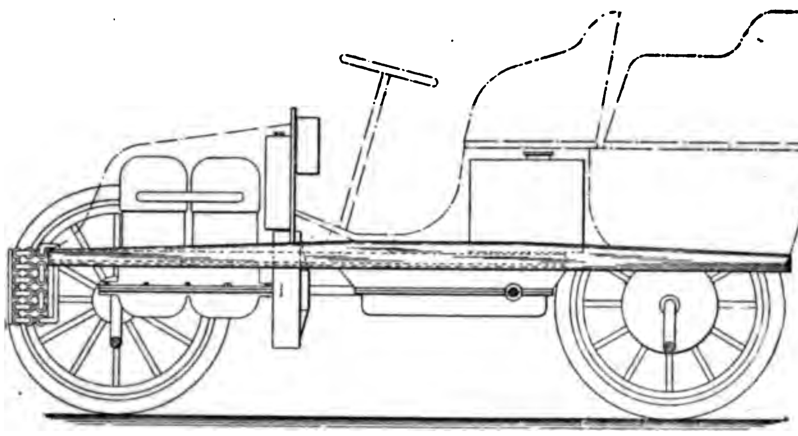
The inventor's object is to provide a burner using hydrocarbon oil, which is vaporized by the heat of its own combustion. None of the parts become overheated and back burning is prevented. The burner casing is preferably of the shape of a box and closed at the bottom. The



frame is provided with a continuous opening that extends around it. The gasoline enters at one end and passes out into the initial generator after having become heated, and eventually mixes with the air and issues from the gas distributer's perforations. There are a number of parallel bars in the upper part of the casing with openings for the water pipes. The latter system is connected up to the reservoir at one end and the boiler at the other.

711,005. Carburetor.—G. M. Shebler, of





No. 711,441.

Indianapolis, Ind. October 14, 1902. Filed April 21, 1902.

The object of the invention is to provide a carburetor in which the level of the liquid bears the same relation to the discharge nozzle at all times, so that the feed will be uniform irrespective of the condition of the road surface. The cut shows the carburetor with a horizontal air pipe which extends through it. A spherical spraying nozzle projects into this pipe and is provided with a needle valve to adjust the flow of the fuel. The float has two cores, one to admit the tube of the nozzle and the other for the air pipe. A valve is secured to the float to control the flow of the gasoline to the carburetor. The latter may be modified so that it may become part of a vertical air pipe system.

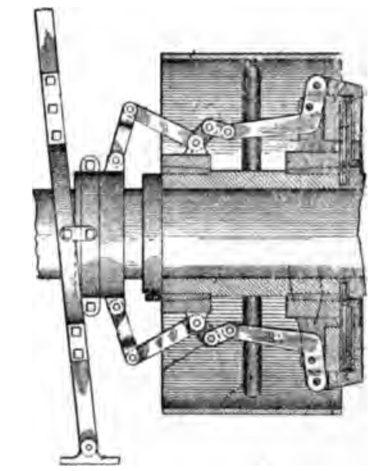
711,441. Motor Vehicle Frame.—A. L. Riker, of Short Hills, N. J. October 14, 1902. Filed July 19, 1902.

The inventor aims to provide a frame that possesses the greatest strength possible with a minimum weight of material. To that end only one frame is employed, i. e., there is no under framing, all the machinery and body being supported by the frame to which the body is secured, which is welded together out of a channel. To save weight those portions of the frame that adjoin the points of support are tapered off. The upper flange is cut off on a slant. About midway between the axles, where the strains and the weight are greatest, the sills are of the full channel section. A frame of angle steel beams is provided to carry the machinery and is riveted to the crosspieces of the main frame.

710,953. Electric Battery.—A. J. Cook, of Jersey City, N. J. October 14, 1902. Filed July 20, 1901.

710,988. Friction Clutch.—H. Muir, of Chicago, Ill. October 14, 1902. Filed March 19, 1902.

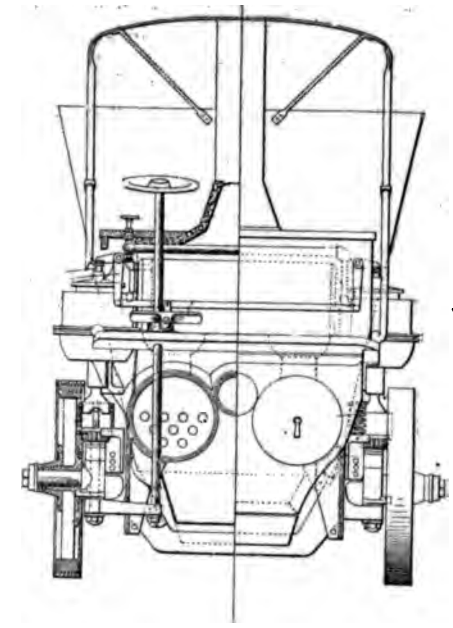
The object of the invention is to provide means for attaining a powerful leverage without increasing the diameter of the clutch. In the cut a movable friction ring is shown on the hand side of the pulley. As shown it is out of engagement. The fulcrum pins of the L-shaped bell cranks that operate the ring are secured to a disk which is keyed to the hub of a key. In order to transmit motion from



one shaft to another in line with it the disk would of necessity be keyed to the driven shaft. There is a sheet steel plate between the friction ring and the disk mentioned, which is secured to the flange of a hub that is in turn secured to a driving shaft. The faces of the friction ring and the disk are covered with paper. The cut shows how motion to the ring is transmitted from the lever which the operator grasps.

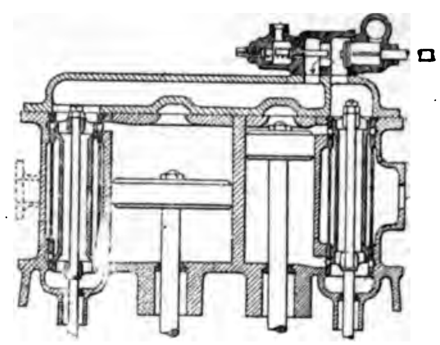
711,112. Steam Truck.—W. H. Knight, of New York, N. Y. October 14, 1902. Filed February 25, 1901.

The object is to provide a truck in which the steam generating and motive members are rigidly connected together in such a manner as to reduce to a minimum the difficulties usually arising from deterioration, leakage and condensation in long pipe connections, and to provide spring support for such members, while also providing for driving connection between the motive members and the driving wheels, which are also the steering wheels. The driving connections are such as to allow of the turning movements of each steering wheel on its steering pivot. The boiler is hung from the vehicle body. The former comprises water drums below and an upper drum, which is connected to the water drums by risers. In the fire box there are feed water heating tubes and a grate. The frame that carries the boiler is provided with vertical grinding plates which keep the front axle in parallelism with the rear axle. There are two engines which drive the front wheels by means of level gears. Extensible couplings are provided between the engine and pinion shafts to permit vertical movement of the front axle.



711,118. Motor Vehicle.—William Norris, of Preston, England. October 14, 1902. Filed November 5, 1901.

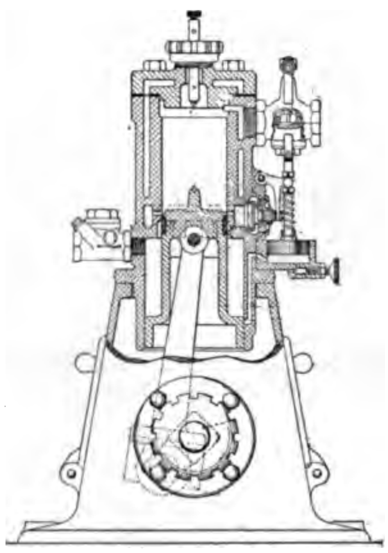
The invention relates to a compound steam engine, and is to provide an improved construction and arrangement of cylinders, piston and intercepting valves. The cylinder cover is utilized as a steam



receiver for the steam exhausted out of the high pressure cylinder on its way to the low pressure cylinder. The drawing shows the intercepting valve closed, so that steam from the high pressure cylinder is admitted to the receiver and subsequently flows into the low pressure cylinder. In line with the intercepting valve is a live steam admission valve which is opened when the intercepting valve is forced against the seat that is opposed to the one shown, against which it is shown pressing in the cut. Live steam then enters the receiver and the high pressure cylinder exhausts directly into the atmosphere through the port shown in (circular) cross section in the illustration. To prevent the live steam pressure from acting on the stuffing box of the piston valve of the high pressure cylinder live steam is admitted to the chamber surrounding that valve from the side, as shown.

711,235. Gas Engine.—E. G. Shortt, of Carthage, N. Y. October 14, 1902. Filed October 5, 1901.

The object in view is to produce an explosive engine in which the products of combustion are wholly removed from the combustion chamber after an explosion. The spent gases are drawn from the working cylinder simultaneously with a secondary exhaust. Means are provided for closing an intercepting valve by atmospheric



pressure in a passageway communicating with the combustion chamber while the gaseous residue of combustion is being withdrawn from the latter. Normally this valve is open, excepting at the moment of the secondary exhaust, when it prevents a back flow simultaneously with the formation of a vacuum in the combustion chamber. The working piston and the piston that sucks the spent gases from the former's cylinder are cast integral. When the crank pin assumes the position shown in the sketch the horizontal exhaust valve is opened and a portion of the gases escape. As soon as the crank reaches its outward dead centre communication between the working and the other cylinder is effected. In the latter a partial vaccum was formed during the down stroke, and as soon as the ducts are uncovered by the working piston the other piston uncovers a port. The vacuum causes the dash pot's piston to close the exhaust valve and simultaneously draws that portion of the spent gases that did not escape into the cylinder below.

711,122. Accumulator.—J. B. Relin, of Levallois-Perret, France. October 14, 1902. Filed December 4, 1901.

The invention relates specifically to the form of the elements or plates of accumulators. The electrodes or plates consist of a frame of rectangular form, provided with one or more rectangular recesses formed in and through the same, the bottom and side walls of which recesses are of triangular form in cross section and having the under side thereof provided on one or both sides with a series of steps, to the outer face of which are soldered a plurality of small plates or strips of such form as to present an extremely large surface to the action of the electrolyte. These strips may be twisted, bent, flattened, pitted or indented to retain the active material and facilitate the circulation of the fluid.

711,429. Carburetor.—T. H. J. Leckband, of Adair, Ia. October 14, 1902. Filed May 31, 1902.

711,387. Condenser for Steam Motors.—A. P. Dodge, of New York, N. Y.

The condenser consists of header plates into which the tubes, through which the currents of air pass, are expanded. These tubes are arranged in longitudinal and transverse rows. The condenser is intended to be placed on the roof of a motor car.

711,311. Steam Boiler. —H. K. Hess, of Philadelphia, Pa. October 14, 1902. Filed June 14, 1902.

The object of the invention is to render a boiler self repairing to a certain extent by utilizing the causes of the leak, such as excessive heat, to again seal the broken or leaky joint by confining a fusible bonding metal or metal flux in juxtaposition to the joints of the flues with the heads. This metal is normally as tenacious as the boiler and flue metal, but is fusible at a much lower temperature than would be required to melt the boiler or flue metal. The flue tubes are supported in such a way as to permit expansive movement without drawing out the bonding metal.

711,481. Storage Battery Plate.—Nathan T. Daboll, of New London, Conn. October 21, 1902. Filed February 19, 1902.

The foundation for the plate when made up in the preferred or mattresslike form is composed of steel or iron gauze, the sides of the gauze foundation being separated and having their edges turned over on three sides, forming a thin pocket open at one end. In this open end is inserted finely shredded steel—such, for example, as is commonly known as "steel wool"—and then the fourth side closed. To hold the parts in place for the completion of the plate and during its active operation as a battery plate, the opposite sides are tacked together at intervals through the stuffing of shredded steel, in a manner similar to that in which mattresses are tacked, by means of a malleable steel or iron wire. The foundation of the plate having thus been completed, there is applied thereto a coating of finely divided carbon. This may be applied by making it into a stiff paste by mixing it in a water solution of any hydro-carbon—sugar, for example—as a binder, and after it has been applied in this paste form the plate is submitted to the action of heat sufficient to carbonize the binder of the finely divided carbon, leaving the surface of the carbon coating hard. This surface is then painted with white lead, using for this purpose a stiff paint brush, and allowed to dry to complete the plate. In the simplest form of plate, where the foundation is a simple sheet of gauze this sheet is coated in the same manner as the mattresslike foundation above described with finely divided carbon, and then after carbonizing it it is furnished with a coating of white lead paint. It is claimed that storage battery plates constructed in this manner are very light in proportion to the electric energy obtained by their use in a battery, and that where the plates in common use require to be charged and discharged some twenty times, more or less, in the process known as "forming" before the highest efficiency of the plate is reached, a plate constructed in the form above set forth, particularly with the mattresslike foundation, requires only one or two chargings before the plate reaches its highest efficiency.

711,917. Storage Battery Plate.—Edward H. Winkes, of Buffalo, N. Y. October 21, 1902. Filed April 25, 1902.

The plate consists of a supporting frame, preferably of lead and antimony, wherein is mounted a long sheet of lead folded back and forth to present numerous corrugations, which constitute the active surfaces of the plate, said sheet preferably being cut through at each fold for a portion of its width and provided with spacing bosses or projections to separate and support the several folds or cross tips thus formed.

In effect the plate described consists of a multitude of cross tips of lead mounted in a surrounding frame in close proximity to each other. By using a properly formed sheet of lead for this construction, however, the cost of manufacture is extremely low, and the plate is very readily assembled and completed.

711,902. Carburetor for Explosive Engines.—J. D. Leppo and D. M. Leppo, of Mansfield, Ohio. October 21, 1902. Filed August 13, 1901.

711,675. Vehicle Construction.—Edward H. Phipps, of New York, N. Y. October 21, 1902. Filed February 8, 1902.

711,520. Electric Motor for Vehicles.—Harry G. Osburn, of Hoboken, N. J. October 21, 1902. Filed May 6, 1901.

711,652. Sparking Mechanism for Gas Engines.—Ernest S. Bowen, of Auburn, N. Y. October 21, 1902. Filed July 5, 1901.

711,710. Storage Battery.—Daniel E. Wiseman, Chicago, Ill. October 21, 1902. Filed March 12, 1901.

711,628. Explosive Engine.—James F. Hill, Fleetwood, Pa. October 21, 1902. Filed June 12, 1901.

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Automobile Legislation.

The whole subject of automobile legislaon in the United States may be said to solve itself into the questions of proper eed limits, license and how to secure the eatest possible uniformity of regulation roughout the land. At one time it was ld that no special legislation was necesry to regulate the new form of locomoon, but this view, if still held by some. is certainly lost ground during the last ar. A number of States, including New York, Connecticut and Massachusetts, have passed State laws regulating automobile traffic, and in States in which there are as yet no such laws numerous local ordinances have been passed.

Taking up the matter of speed limits it is now generally recognized, as Mr. Chamberlin, of the Automobile Club of America's law committee, points out, that no limits can be prescribed for any specified district which are safe for all conditions. Even if cities were divided into several zones according to the congestion of traffic in their streets, and different limits were prescribed for each zone, such regulation would still be practically null. If the limits are fixed low enough to be safe for the worst conditions, they would be too restrictive to render automobile traffic practicable under normal conditions. This fact is recognized by all State laws, since they contain a clause stipulating that the "vehicle shall not be driven at any greater rate of speed than is safe and proper, having regard for the condition of traffic upon the road," or words to that effect.

The question arises, Is not this rule sufficient, and is not any definite speed limit which does not take account of the condition of traffic upon the road superfluous and injurious to the interests of automobilists? Numbers of prominent automobilists take the standpoint that it is, especially so far as the open country is concerned. In other parts of this issue it will be seen that the regulations in force in various sections of the German Empire do not specify any definite speed limits for country roads, and that the chief object of the bill now before the British Parliament is to remove entirely the speed limit to which automobiles are now subject in Great Britain. In this country, too, this broader idea has its champions, the argument being that if automobiles are not allowed to be driven above a speed that is safe and proper the rights of the public are fully protected.

The trouble with this provision is that it is too indefinite, that views as to what is safe and proper differ too much with the individual automobilist. In case of an accident and resultant legal action it would, of course, remain with the bench and jury to decide whether the speed had been safe and proper, if this question came up. But the object of the law is not only to form a basis for the equitable adjustment of legal differences, but also to serve as a preventive of accidents by prescribing safe and proper conduct in definite terms.

The average automobile driver may not be able to closely gauge his speed, but a definite limit of, say, 20 miles an hour certainly means more to him than the speed where danger begins, the danger limit. The sense of danger is dulled by indulgence in the passion for speed. In the Fair accident, for instance, it is reasonable to suppose that the driver was not conscious of imminent danger when driving at excessive speed immediately preceding the accident. But he must have been aware that he was exceeding by far the speed limit fixed by law, and this consciousness should have caused him to slow down, where a sense of danger could not. Of course, definite speed limits will not prevent all reckless driving, as this case cited plainly illustrates; but they ought to be effective, if just and reasonable, with those imbued with respect for law and reasonable authority. A speed limit, therefore, is quite desirable even for the open country, as much for the benefit of the automobilists themselves as for the protection of the outside public.

The question of licensing automobile operators is now receiving much attention. Chicago was the first city to require licenses, and has been followed recently by Cleveland and some smaller towns. The licensing system seems to have proved quite satisfactory as far as it has been practiced in this country, and the general senti-

ment of the leading automobile organizations and of the public press seems to be favorable to it. A license law will prevent novices from driving to the common danger on public streets before they have acquired the requisite skill in the manipulation of their vehicles, and perhaps, still more important, will place automobile drivers under greater responsibility. There is little or no objection to licensing if the laws are formulated so as to insure the greatest convenience in obtaining the license and to prevent abuses of a political nature. A Federal license law, it seems, is incompatible with our system of government. The best that can be hoped for is State license laws and an agreement between all or at least neighboring States by which each shall recognize licenses issued by the other.

The question of uniform speed legislation can probably only be solved along these lines. Those States in which the movement has been making less rapid progress will have the benefit of the experience of other States when they find it necessary to enact automobile laws, and it is to be recommended that in such cases those State laws which have been in force for some time should be studied carefully, and the most satisfactory in operation be copied as far as possible.

We cannot refrain here from comparing the State laws of New York and Massachusetts. The New York law limits the speed to 20 miles per hour and 8 miles per hour in the open country and in built up sections respectively. In Massachusetts the respective limits are 15 and 10 miles per hour. There is one other important difference, however, between the two laws, namely that the New York law gives local authorities the privilege of increasing the speed limit in towns, as they may see fit, while the Massachusetts law accords them the privilege of reducing this limit. The New York law we consider much preferable in this respect. It prevents the possibility of harassing restrictions by sometimes rather biased and short sighted local authorities, which might and would lead to the same confusion of speed regulations as now exists in New Jersey without a State law. With the New York law there is some chance for an increase of the speed limit in built up districts if the authorities can be convinced that the increase would not be attended with danger to the public. This we feel sure can be done as soon as the automaniac has been stamped out. *The 20 mile an hour limit* country is reasonable, and is objected to by few automobilists. The 8 mile limit for built up portions is somewhat too restrictive for many conditions, but there is some satisfaction in the reflection that local prejudice or a local burst of feeling cannot further restrict this limit, and that an increase of the speed limit is not made impossible by the law.

The New York State law may therefore be pointed to as the most satisfactory speed law now in force in this country, and may be recommended for the guidance of other legislative bodies having to deal with the subject of automobile regulation.

Government Inspection and Approval of Vehicles.

The various automobile laws in force in Continental Europe place the construction of these vehicles under Government control. Every type of automobile that is placed upon the market must be submitted to inspection by a department of the Government and must satisfy certain requirements of the law. A certificate of approval or of inspection issued for any type permits the construction and use of any number of duplicates of that type.

It might be expected that manufacturers, for the sake of their own interest, would provide all the necessary safety appliances that could properly be demanded by a law, of their own accord; and that the intelligent users would refuse to accept a vehicle that was lacking in these respects. Experience shows, however, that such is not always the case. When the enthusiasm is at its height safety appliances are often thought of lightly, and Government supervision of this matter would be quite to the point.

In Europe two brakes are generally required, which must be entirely independent of each other, and at least one must be as effective for backward motion as for forward motion. It can hardly be said that this demand is unreasonable. Quite a number of American automobiles satisfy this requirement; but there are other vehicles which have only a single brake, and in some of them the brake is operative only for forward motion. With no means for checking backward running down hill when the power is shut off, a vehicle is evidently defective; and although this has been known for a number of years such vehicles continue to be manufactured. regulation of this matter would quite apropos.

If such a law should be taken sideration it should also provid making it impossible for unauthor sons to start the vehicle when l ing on the street. A license bill n ing in this city prohibits leaving biles standing in the street un This requirement if adopted woul hamper the use of automobiles l cians and for similar work, as o chief advantages of the vehicles lines is that they can be left sta the street for long periods witl safety. Locking the vehicle shou quired instead; it would be equal ive and much less annoying to mobilists.

Another point that should not looked is that all control levers timely movement of which mig seriously, should be provided w pins or similar locking devices. the security of the steering gear s passed upon.

The Yonkers Sentenc

From the details of the accident ers, reported in another columr issue, it seems that it can hardly l that the driver of the automobile v of negligence, and in consequenc in the blame for the accident. T ity of the penalty imposed, howev unjustified and calls for resentme automobile interests. It appears hurry with which the proceedir conducted, the uncompromising a the judge and the severity of the that the anti-automobile feeling s prevalent in that locality was of u fluence in this case. Judicial opini ever, is expected to be entirely u by momentary popular feeling c dice, and only the tenets of the the circumstances of the case are to determine the penalty inflicted.

The case under discussion was one of simple negligence devoi criminal intent, for the exact c which determined the nature of dent could not possibly have been and ordinarily one would have the occupants of the automobile to be greater danger than the passenge car. The platform of the car, it chanced to be of nearly the sam from the ground as the upper pa rear automobile wheel, and it ca "rode" on this wheel, which cause to capsize.

ted before, for a case of negligence iew of the fact that there were no , the penalty must be considered sarily severe.

e other hand, the occurrence ought e a lesson to those, often of the class, who habitually violate the safety in automobile driving, or y public sentiment and the laws of l. The problem of automobile ac- will not be solved by denying the e of such accidents à la faith cure ; and the cry of injustice, etc., damage is done, will be of little en disregard of the road laws is The only remedy lies in prudence thought in operation. In this, as matters, an ounce of prevention is pound of cure.

ion of European Auto Laws.

in England the first automobile sed served the purpose of legaliz- mobile traffic and of "emancipat- tomobilists, in other parts of Eu- first laws were of a restrictive na- egislation on the Continent began as automobiles were made power- gh to attain dangerous speeds. In hen the first automobile law in was enacted, an average speed of miles an hour had already been on the road. The movement en passed through a booming pe- he authorities did not oppose the e public roads for contests, but as er of accidents had already hap- it seemed opportune to provide rt of legislative restriction, espe- nce the power and speed of the were rapidly increasing.

majority of the French automobil- committed a blunder which has en often repeated elsewhere. They stand that there was no need of d other restrictions, ridiculed the d law, and generally regarded es as a distinct class whose inter- re opposed to those of the com- at large and of the Government. eling became even more pro- two years later, when, the Gov- having become aware that some- ust be done to further restrict reck- ing, large number plates were pre- for all automobiles which were of traveling at a speed greater than es an hour. The Government was of attempting to kill a promising , the idea of the plates was declared ridiculous and calculated to injure innocent parties; numbering, it was said, was treating every automobilist as a confirmed criminal, etc. Since the law has gone into effect these objections have entirely ceased, and there is no record of any harm whatsoever having been done the industry.

The idea that the automobile movement has interests which conflict with those of the general public is absurd. If the automobile were limited to a special class of society or to certain lines of trade such a condition might arise. But the motor vehicle is to benefit all classes; it is to be the general means of transportation for short distances in the future, as well as a pleasure vehicle, and is to largely if not wholly supplant the horse in some fields. The question which must determine legislation is how this revolution can be brought about with the least inconvenience and without infringement of the rights of anyone. It is not only the people materially interested in the automobile business who want to see the automobile the common means of transport on streets and roads; the general public longs for it as well, for the advantages of automobile over horse traffic are not solely enjoyed by those in whose interests the traffic is carried on.

Little is being said now in France regarding the law being just or otherwise. Arrests are frequent in the capital, but the fines imposed are small as a rule.

The most unsatisfactory state of automobile legislation exists undoubtedly in England. There the speed limit is so low that the law is generally regarded as notoriously unjust, and high officials of the Government openly and habitually violate the speed clause of the law. The situation has become almost unbearable for those who are willing to keep within reasonable bounds of speed, yet want to enjoy the full advantages of the automobile. One of our English contemporaries in its last issue to hand cites over fifty cases of convictions for furious auto driving in a single week.

The situation with regard to arrests for furious driving is rather queer. It seems that a considerable number of the automobilists blame the policemen and the magistrates, the former for carrying out the directions of their superiors and the latter for enforcing the law, instead of working for a repeal of the law, which is certainly where the fault lies in the majority of cases where an injustice is being done an automobilist. In fact, now that legislation is proposed to remove the obnoxious speed limit, and at the same time requiring that automobiles be provided with identification numbers, as required on the Continent, it is urged by some that there is no occasion for any hurry in the revision of the regulations, and that on no account should the numbering provision be acquiesced in. The only explanation of this state of things we can reach is that the parties prefer the glory of playing the part of martyrs or are convinced that no matter how the laws might be modified they could not restrain themselves within its bounds, and would, of course, rather be convicted under a law popularly acknowledged unjust than one bearing the stamp of justice and reason. For the sake of the movement in England, however, it is to be hoped that the unreasonable speed restrictions of the present Local Government Board will be removed at an early date.

The Contest Awards.

In a table on another page in this issue is given the showing made by every vehicle which completed the recent Reliability Contest, both as regards average speed and reliability marks earned. We have added to the figures furnished by the committee a column giving the reliability marks earned in per cent. of the maximum possible, which we believe will facilitate an estimation of the vehicle's standing in this respect.

The list of awards leads one to the conclusion that the affair was more a success as a demonstration than as a contest. Viewed as a demonstration, there is indeed cause for congratulation that sixty-five out of seventy-five vehicles started should have earned a first class certificate; but viewed as a contest the result is not quite so satisfactory, for as the awards of practically all vehicles are the same we are still left in doubt as to the relative merit of the performance of the various contestants. The possession of a first class certificate might be taken by the uninformed to signify an unsurpassed record, which would, of course, be quite incorrect in some cases. The cup awards improved matters somewhat, chiefly because these awards were made according to reliability marks earned and not for speed. In future contests the certificates should be awarded on this same basis, and first class certificates only for a perfect or almost perfect record. The possession of such a certificate would then be more of a distinction and of more value to its holders.

VIEWS OF CLUBS AND OFFICIALS.

WINTHROP E. SCARRITT, PRESIDENT OF THE AMERICAN AUTOMOBILE ASSOCIATION.

Referring to the existing New York State law, Mr. Scarritt said he considered it to be fair, but that he would prefer to see the limit extended to 10 miles in cities.

He regards all legislation as a compromise and says: "We automobilists have to be considerate of the feelings of other users of the highways, for, while we may be driving in the city at a rate that is perfectly safe, and at which we have and know we have our machines under absolute control, yet that speed may appear to spectators to be unreasonable and dangerous. We must take into consideration the feelings of those not accustomed to automobiling and who regard it as a dangerous mode of travel, and be willing to sacrifice something in the way of speed in order to propitiate the general public during this probationary and educational period through which the automobile is passing."

Mr. Scarritt objects to the jail penalty and thinks it should not be upon the statute, as it enables magistrates to commit to jail for running, say, at 8½ miles an hour. While most magistrates will, no doubt, interpret the law liberally and not convict where the driver has shown a disposition to keep as near the limit as possible, yet, as a matter of fact, the courts have the power to commit to jail for driving above 8 miles an hour on city roads.

On the subject of licensing automobilists, Mr. Scarritt declares in favor of a national system, insuring uniformity throughout the country, and if that is not possible of attainment, then he would like to see a State system adopted, the terms of such State system to be similar in, say, the home States around New York. He thinks an automobilist can hardly be expected to carry along with him different sets of laws pertaining to adjoining States, with the variations adopted in different counties and towns in said States, as an ordinary run would cause him to do so much study on the subject of speed legislation that the other objects of his journey would be lost sight of altogether.

While the general public is demanding that automobilists should carry lights, etc., Mr. Scarritt finds by his own experience that it is very necessary that horse drawn vehicles should be similarly equipped, as in operating your automobile you are apt to come upon a horse and buggy without warning, and with barely sufficient time to turn aside for it; they making no distinguishable noise and rarely having any light indication to show them up in the dark.

In issuing licenses to automobilists Mr. Scarritt would have the driver undergo an examination as to his ability to operate, the license to state the particular power he desires to operate, for which purpose a series of test questions should be put, which would bring out facts as to his ability and his title to the privilege he desires.

Then for flagrant misdeeds on the road the license should be suspended for a proper length of time.

Reverting to the question of imprisonment as a penalty for excess of speed, Mr. Scarritt believes that impounding the car itself for periods of ten, thirty or ninety days would be equally effective punishment, and at the same time would avoid the disgrace which always attaches to a term in jail.

GEORGE F. CHAMBERLIN, CHAIRMAN OF THE LAW COMMITTEE OF THE AUTOMOBILE CLUB OF AMERICA.

Mr. Chamberlin takes an extremely broad view of the subject of legislation governing automobiling, and expresses the opinion that no special legislation whatever is necessary, provided all would rely upon those rights inherent to the Anglo-Saxon people under their common law. He refers to Section 167 (chapter 531) of the laws of 1901 as a statutory expression of common law governing the situation, it reading as follows:

"No person driving, or in charge of an automobile or motor vehicle, on any street, avenue, parkway or driveway in this State, shall drive the same at any greater speed than is reasonable and proper, having regard to the traffic and use of the highways, or so as to endanger the life or limb of any person."

Mr. Chamberlin considers that reason in the exercise of proper care in operating and consideration for the rights of others should determine speed and manner of travel. In some places a speed greater than is now permitted by law is as safe as would be the veriest crawl, and, again, the lowest legal limit is oftentimes much too high a speed at which to travel in certain crowded places. Therefore he contends that whereas special laws may be useful in bringing men's minds to bear closely upon the subject of speed regulation, as a matter of fact full remedies for reckless driving and speeding to the annoyance or endangerment of other persons are offenses against which protection may be as well secured under the common law rights as under any special ordinance in force or projected.

Regarding licensing automobilists, Mr. Chamberlin expressed himself as not favorable to such system, but if it had to come, a uniform system should be worked out, so that one would not be put to unnecessary annoyance in traveling from place to place.

ALBERT R. SHATTUCK, PRESIDENT OF THE AUTOMOBILE CLUB OF AMERICA.

Mr. Shattuck said that in his opinion it would be desirable to have a Federal license for drivers of automobiles, and that this license should be operative throughout the whole of the United States, just as the licensing of engineers o[r] boats on inland waters is operati[ve] entire district where the license i[s]

"The attorneys for the club," he ued, "have advised us that suc[h] would be unconstitutional because interfere with State rights, and all procure a Federal or national lic[ense] been abandoned by the club.

"An ordinance is now before t[he] of aldermen of New York city wh[ich] vides for a license to operate an bile in Greater New York. Th[e] nance, if it ever becomes a law opinion of the club's attorneys w[ill] nullity, because the amendment highway law in this State, wh[ich] adopted nearly two years ago, that any person operating an aut[omobile] except drivers of public hacks, t[axi] vehicles for hire, shall not be req[uired to] obtain any license or permit pur[suant to] the provisions of any local or n[...] resolution or ordinance. It is [...] when the law committee of the [...] aldermen understand this matter ordinance in question will be dro[pped.]

"In this State the present law [...] in a large measure, local authorit[ies] interfering with the rights of dr[ivers of] automobiles which are governed b[y the gen]eral State law. In the State of N[ew Jer]sey, however, each community m[akes] its own law, and should every d[river of] an automobile comply with the [regula]tions of each municipality he wo[uld find] his automobile pretty well cover[ed] with numbers, initials, etc.; and [because] of the many regulations as to spee[d in] different parts of New Jersey it [is pecu]liarly difficult to run an automobil[e in that] State.

"At a recent meeting of the gove[rnors of] the club a committee was appointe[d to con]fer with the committee of the Nati[onal As]sociation of Automobile Manufact[urers to] consider the licensing of the driver[s of au]tomobiles and the passing of such [laws as] would decrease the number of acci[dents be]cause of the want of skill or p[oor con]struction of automobiles in use [in this] State. The National Association o[f Auto]mobile Manufacturers also appointe[d a com]mittee, and a joint meeting of th[e two] committees was held, at which it [was de]cided that both the club and the [associa]tion would together try to procu[re legis]lation upon the following points:

"First—That the State should [license] operators of automobiles, first r[equiring] them to pass an examination whic[h would] show their ability to handle vehicle[s.]

"Second—That the State should s[upervise] in some manner the construction o[f au]tomobiles used in the State, so a[s to insure] that they were built in a manne[r that] would give the greatest safety to th[ose rid]ing in them and to the public on t[he high]ways.

"It was also decided that an effor[t should] be made to get all the States of t[he coun]try to pass a similar law and to

tate passing a similar law would
:he license issued by the State of
: on condition that the State of
: would recognize the license is-
:em; in other words, that a license
New York will enable the driver
mobile to use it in New Jersey
:tting a new license there, pro-
State of New Jersey passes a sim-
d reciprocates in this matter with
of New York. Copies of all the
laws with regard to the Govern-
ol of automobiles have been sent
on as they are received the com-
the club and the association will
this matter, and before January
ect to report to the club and the
a bill for their approval, to be
in the Legislature at Albany,
: above views into effect.
s no question in my mind that
:r control of operators of auto-
necessary than that which now
o many young men think they
ith a knowledge of how to oper-
mobile, that it requires no teach-
experience. They buy one and
vith it. The result is disastrous
them and their passengers but
lic at large, and the public feel
should be protected from people
nd. Then, too, some manufac-
foolishly building automobiles
roper devices and a proper
f parts to insure safety to their
and to others on the highways.
mething which should be pre-
the State.
esent law of the State of New
regard to speed is a very fair
one. Twenty miles an hour in
is fast enough. Under this law
e local authorities may increase
f speed above 8 miles an hour,
in the suburbs of all cities this
eed should be increased to 15
our. It is to be remembered that
r cities in this State extend for
s and a very large part of their
e simply farming lands. For in-
Greater New York is some 40
and to cross it in an automobile
ed provided for by law would
hours. It seems to me it would
proper to increase the rate of
he suburbs of all cities."

:VANS, PRESIDENT OF THE BUF-
'ALO AUTOMOBILE CLUB.

sent situation in Buffalo in re-
tomobile rules and regulations is
:
fore Buffalo automobilists have
:ed to operate their automobiles
:ry old ordinance, which has al-
n but 5 miles an hour on Main
business street of Buffalo, and 8
our on the rest of the streets of
All summer we have been agitat-
atter, and drew up an ordinance
a speed of 8 miles an hour down-
15 miles an hour through the rest of the city. This ordinance was passed by the board of aldermen, but was tabled by the councilmen; there it remained for some time, with the final result that a few days ago a special committee of the councilmen was appointed to look into the speed question, and they recommended that a speed of 8 miles an hour downtown and 12 miles an hour above Ferry street be allowed. This will be the limit of speed in Buffalo.

"In regard to licenses, this question has never been brought up, as automobile owners when buying machines, either electric, steam or gasoline, are given instructions before the machines are turned over to them, which does away with a great deal of reckless operating. Instead of using numbers, the State law requires every owner to display his initials on the rear of his machine. These requirements of displaying initials and having lighted lamps at night are rigidly enforced here.

"The automobile club as a body is using its influence in the strongest possible manner to discourage fast operating; we have had to expel two members of the club for this offense, and nothing is more sweepingly condemned by the club than reckless operating."

GEO. B. LEIGHTON, PRESIDENT OF THE ST. LOUIS AUTOMOBILE CLUB,

is of the opinion that in the use of highways automobiles should be restricted to a normal rate of speed. The essential point is that an automobile has as much right on a highway as any other vehicle, but it has no more. It is improper and unsafe to use the highways for excessive speed whether by motor cars, trolley cars or horses.

"I cannot define my views any more clearly than by quoting the following remarks of Judge Kirkpatrick in the recent case against Felix Warburg, of New York:

"'I have already said to the jury that the defendant had a right to operate his automobile on the public highway, but that he must exercise reasonable care in doing it, so that others who had equal rights upon the highway might not be injured.'

"I have used an automobile myself for upward of two years, and have never had a serious accident. It is always my custom to stop when requested to do so. It seems to me that the sport of motoring is being materially injured by the desire of certain persons to increase the racing spirit. Makers of automobiles are, in my judgment, endeavoring to give their vehicles too much power. What is wanted in America is an automobile that will go at a fair rate of speed on quite a poor road, if necessary. When one has a tremendous reserve power in the vehicle, the temptation is to speed. The worst enemies of motoring in this country today are certain drivers of motor cars. They have brought upon the sport a hostility which we all must suffer from.

"I am a firm believer in a license for motor vehicles, or, more properly, a license for the operators thereof; not for revenue purposes, but to insure that people who are out upon the streets and highways have at least a general knowledge of the vehicle they are attempting to guide. None of these restrictions can in any way hurt those most devoted to the sport. Those people who now enjoy motoring at excessive speed are the ones to whom it will prove to be a fad, and it will fall into disfavor with them as all other fads have done. But to one who uses his motor rationally I am sure it will be a lasting enjoyment. I have used my machine in New England and in the West and have enjoyed the sport exceedingly; but a careful observer must recognize that a great deal of the disfavor that some have toward motoring is due to the disregard of rights on the part of owners and drivers of automobiles themselves."

THE COLORADO AUTOMOBILE CLUB,

through its secretary, Dr. W. H. Bergtold, states that it supported a proposed ordinance to be enacted for the city of Denver which would limit automobiles running within the city to a speed of 15 miles per hour, except within the congested district (definitely limited), wherein the speed should be not more than 8 miles per hour, and over the whole city at street intersections the speed to be reduced to a safe pace, amount of travel and traffic considered. This proposed ordinance failed to pass.

The club is almost unanimous against licensing or numbering the cars, but agrees that if identification marks be required on the carriages they should take the form of the owners' initials, and not numbers.

During the summer the City Park commissioners put into effect a rule excluding automobiles from the City Park after sunset. The club immediately thereafter took action, and through its legal rights committee took the first steps asking for an injunction in the matter, but before this injunction could be executed the obnoxious rule was withdrawn.

The present ordinance in the city of Denver concerning the speed of ordinary vehicles limits them to 8 miles an hour, and at street intersections to 4 miles. Since there is no special law regarding automobiles in force in Denver the vehicles are amenable to this ordinance.

The club has passed resolutions condemning reckless or unsafe automobile driving and has passed a rule instructing its members to report any such reckless or unsafe driving to the executive committee, which will then endeavor to prevent such conduct by expulsion if the offender be a club member, or by legal action if he be not a member. The legal rights committee has been requested to confer with the city attorney to learn if he considers numbering automobiles and not other private vehicles constitutional, and if he does not, to request him to so

advise the city council. Recently the City Park commissioners have excluded automobiles from the roads of a small circular garden in the City Park; the club has called the park commissioners' attention to the fact that it will protest against this rule unless other vehicles are laid under the same ban.

THE TOPEKA (KANSAS) AUTOMOBILE CLUB.

The thought of placing a special tax or license fee upon automobiles struck us as one of the most ridiculous propositions ever advanced. For what purpose should such a tax or license be levied, we would ask? An automobile does not bring filth upon the streets; it causes no wear upon the pavements like a vehicle drawn by a horse with feet shod with steel, cutting away little particles of the asphalt and brick paving until soon it has to be replaced. The owner of an automobile should receive an annuity from the city instead of having to pay a fine or special tax.

In our opinion the day is not far distant, if this class of legislation is permitted to go on unchecked, that vehicles of all kinds drawn by horses will not be permitted to enter the most prominent thoroughfares of some of our principal cities, and when one consider the flies brought into a community where horses are kept, and the filth caused upon the streets, which wafts into elegant homes, there to befoul draperies and fill the houses with deadly germs, it would not be such a fool piece of legislation either.

The writer can see no objection to numbering automobiles; neither can he see any use of it, any more than numbering any other conveyances.

In regard to speed I consider that an automobile going at the rate of 20 miles per hour is no more dangerous to life than a horse going at the rate of 10 miles per hour. JAS. M. PADGETT, President.

THE LONG ISLAND AUTOMOBILE CLUB.

The automobile of today is chiefly a pleasure vehicle for the few, and this aspect of its use has in the minds of many people nearly overshadowed its possible future. To the student of its progress, however, it is impossible to doubt that the automobile is today but on the threshold of its future usefulness, and that as a means of commercial transport, particularly in our cities, it is destined to supplant the horse and to be of great and enduring public benefit. In the nature of things the commercial vehicle must await the perfecting of the pleasure vehicle, and it is therefore to the interest of the public that the popularization of the latter, and through this its rapid mechanical development, should not be hampered by unreasonable and oppressive legislation. On the contrary, it should be given all the support and encouragement possible.

It is well known that automobiles are today capable of traveling at speeds reaching 30 or 40 miles an hour on the open road, and that these speeds may be reached, under suitable conditions, without endangering or inconveniencing other users of the road. It is likewise a fact needing no elaboration that in the business portions of cities a speed of even one-tenth the above may sometimes be not only dangerous but impossible. Between these two extremes lies the whole reasonable range of speed, governed by the conditions of roadway and of traffic in each particular case.

Because the range of speeds attainable with propriety by the automobile is so far in excess of that physically possible to the horse, it follows that no arbitrary schedule of speed limits can possibly be framed which will fit the conditions of highway traffic. A speed which would be out of the question on lower Fifth avenue might be far below that permissible on Pelham parkway or even Riverside drive, and a speed safe on Fifth avenue in the morning might be dangerous six hours later. There are streets in New York, notably in the tenement district, where no automobile ought ever to travel faster than 6 or 8 miles an hour, and there are highways in the boroughs of Queens and Richmond in Greater New York which, for all practical purposes, are in the open country. No possible set of speed limits could be framed for cities which would meet these widely divergent conditions; and the difficulty is less only in degree in the smaller cities of New York and other States. Any speed law whatever requires to be supplemented with constant reference to the common law of the road, and no speed limits, if enforced to the letter, would be tolerable for one day. The same situation, mitigated in proportion as the traffic is less thick, holds in the smaller villages and country districts.

It follows from the above that what is really needed to regulate the speed of automobiles is not an arbitrary speed limit, high or low, but an enlightened application of the common law of the road. Except in unfamiliar localities the automobilist is always the best judge of his own safe speed. The law should give him the utmost freedom in selecting this speed, and should charge him with corresponding responsibility in case of accident. The officer afoot can seldom estimate with even approximate accuracy the speed of a passing vehicle, and it is mere folly to make such a one the immediately responsible party, leaving the automobilist nothing to do but exercise his wits—and, perhaps indulge a sporting instinct as well—in maintaining the best speed practicable while eluding the representatives of the law. Cease to harry the automobilist with stop watch timing, arrests and petty prosecution, but give him to understand that he will be liable in the heaviest damages for reckless driving, negligence or manslaughter if he gets into trouble. Enforce this law impartially against rich and poor, and we shall soon see an end to the recklessness by enced drivers, and the undue s| few, which are at the base of wh exists against the automobile.

The speed, braking power and n ing qualities of the automobile in propriety of much more liberal in the matter of speed than pul can accord to the horse. Such lib ment cannot fail to come, and at day. In view, however, of the l ber of inexperienced drivers no road, and in view of the fact that mobile itself, and its position in regard, are still in the formativ is not improper that the State sl a time at least, exercise a certai of supervision in the matter. Tl vision, however, should not be cc automobiles and automobilists alo a matter of common knowledge of the runaways and other horse wherein automobiles are involved quite as much to the nervousnes competency of the driver of the to the mere presence of an autom the centres of population the ho already lost their fear of automo so long as timid horses remain it behooves the automobilist to dı care and consideration, but the hoı as well should be sure of himsel beast. As regards reckless drivin well be doubted if automobilists proach the amazing carelessness a ference with which the drivers of livery wagons use the streets of c The Long Island Automobile (cordially support any licensing even any fair speed limit, whic alike to the automobilist and the h and has for its aim the protectic public from the reckless or inc driver, the badly built machine, badly broken horse. It will like port its rigorous and impartial enf and the application of whatever prove most effective, whether fines, imprisonment, revocation o or the impounding of horse or au

W. WALLACE GRANT, Pr

PHILADELPHIA AUTOMOBILE CI

Henry G. Morris, in reply to a as to the position of the club on bile legislation, said that the clu favor of a city ordinance applyi vehicles and opposed to one regul operation of automobiles alone.

It was believed at present that nance now in the city councils with the approval of the majorit zens.

He further said that while the 10 miles an hour was thought by bilists to be rather low, yet it was that a higher rate of speed would stituted later when the public beca accustomed to automobiles.

John S. Muckle, also of the cl mittee, said that the ordinance no

councils was draughted by the governors of the Automobile l so was an embodiment of their o far as a general law applying to es can be.

l the club did not propose an or- ıpplying to automobiles only, as ed it would be successfully at- n the ground that it would be ;islation, and hence unconstitu-

ther said that the new ordinance, would be a distinct advance over now in force, as it would permit an hour instead of the 5 and 8 v provided for.

led that the new ordinance now e city councils was at present in nittee on law, and that it would : up for final passage before Feb- ct.

ɪns of Anti-Speed Organizations.

. PARKER, SECRETARY OF COMMITTEE OF FIFTY.

ırker particularly expressed him- ı personally and on behalf of his s being by no means antagonistic obiles, and strongly urged that he realize the present value of motor and the perfectly apparent im- these vehicles will have in future ɪn.

same time Mr. Parker and the e of fifty deplore the present of so many automobilists to drive ıreasonably fast rate, thereby en- g the lives and limbs of other per- l their motive is to promote such n as will effectually stop fast driv- Parker states that he believes au- ı in the city of New York travel w than they did in the spring. He figures compiled by his associ- o, equipped with stop watches, ioned at prominent points in New y. This table contains data show- relative speed at which motor ve- ıd horse drawn vehicles travel. ıres in the following table were on October 21 and 22, from 9 10 p. m. At Fifth avenue, be- cty-sixth and Sixty-seventh streets, nobiles passed at the following speed (miles per hour): 9.47, 9.47, . 14, 15, 11, 12, 14, 18, 10.59, 16.36

n 1 p. m. and 2 p. m., Central est side of the Mall, 8 automo- l 45 horse drawn vehicles passed direction; all automobiles trav- ond the legal limit, the lowest at es an hour, the two highest at les an hour. One horse vehicle at 12.85 miles an hour, 1 horse ve- 12.45 miles an hour, 1 horse vehi- miles an hour, 5 horse vehicles at an hour. All other horse vehicles egal limits.

en 2 p. m. and 3 p. m., Fifth avenue, between Fifty-seventh and Fifty-eighth streets, 22 automobiles and 255 horse drawn vehicles passed in one direction. Nearly all automobiles were going at from 10 to almost 17 miles an hour. Of the horse drawn vehicles, not more than 6 exceeded 9 miles an hour.

Between 3:15 p. m. and 4:15 p. m., on Fifth avenue, between Forty-seventh and Forty-eighth streets, 25 automobiles and 380 horse drawn vehicles were timed going in one direction. Fourteen automobiles were going at not less than 10 miles an hour and up to 15 miles and higher. Of the horse drawn vehicles, 12 were traveling at 10 miles and over, 3 making 12 miles.

From 5:15 p. m. to 6:15 p. m., between Thirty-eighth and Thirty-ninth streets, 22 automobiles, including a number of deliveries, and 130 horse drawn vehicles were timed going in one direction. Thirteen automobiles were exceeding the speed limit, going at from 11 miles an hour to 16.36 miles an hour. Twelve horse drawn vehicles were running at from 10 to 12 miles an hour, none of the remainder exceeding speeds of between 9 and 10 miles an hour.

Between 10 and 11 a. m. on West End avenue, between Seventy-second and Seventy-third streets, 3 automobiles and 52 horse drawn vehicles were timed going in one direction. The automobiles were traveling at from 11 to 13 miles an hour. Of the horse drawn vehicles 7 were making from 10 to 13 miles an hour, and 5 going between 8 and 10 miles an hour. The speed of the remainder was below the limit.

From 11 a. m. to 12 m. on Eighth avenue, between Seventy-second and Seventy-third streets, 6 automobiles and 95 horse drawn vehicles were timed. All the automobiles were traveling at 10 to 13 miles an hour. Fourteen horse drawn vehicles were going at from 10 to 12 miles an hour, and 6 were traveling between 8 and 10 miles.

Between 2 p. m. and 3 p. m., Seventy-second street, from Central Park West toward Columbus avenue, 19 automobiles and 50 horse drawn vehicles were timed. Fourteen automobiles were exceeding the limit, making 10 to 17 miles per hour. Thirty horse drawn vehicles were traveling below the limit, 2 at 15 miles and 3 at between 8 and 10 miles.

Mr. Parker adds that the speed limits noted for automobiles are minimum limits, as speeding is more generally indulged in above the Park. He says that almost every automobile exceeds the legal limit by a liberal margin; but, on the other hand, those horse drawn vehicles that exceed the limit do so very slightly. The committee expects to make a supplemental speed test, and will do so in places where automobiles are known to run faster.

Mr. Parker states that in making their canvass of registered voters in the spring the committee sent post cards to almost 20,000 persons, all above Fourteenth street, the inquiry being intended to ascertain the feeling regarding extending the present 8 mile limit to 10 miles, as proposed by the ordinance introduced through Alderman Oatman. About 95 or 96 per cent. of the answers were unequivocally against such increase. Mr. Parker considers the speeding indulged in by automobilists to be outrageous. He says that he always finds it necessary when sighting an automobile a block away to wait until the car has passed before crossing the street. He says the drivers are so proud of their "perfect control" that they do not even keep to the right, but snake across the street, rendering passage by pedestrians even more dangerous. He says that pedestrians should not be so dependent upon the whims of automobilists that their privilege to cross the street in safety is challenged, and the law should be made to protect them.

TOWNSEND SCUDDER, SECRETARY AND COUNSELOR OF THE LONG ISLAND HIGHWAY PROTECTIVE SOCIETY.

Mr. Scudder states that the society with which he is is associated is doing a vigorous work in policing the roads of Long Island and causing arrests and convictions for infringements of the speed law by automobilists. He says that in Oyster Bay alone their society has spent over $3,000 in this work. Mr. Scudder is in favor of licensing automobile drivers, and he believes an efficient means of punishment would be by impounding the machines. He strongly disclaims any opposition to automobiles, but says that the drivers must be made to realize the importance of regulating their speed, and he thinks they should go slow at present, until horses and the public are thoroughly familiar with them.

Regarding speed legislation, Mr. Scudder said that he favors the making of special laws in localities, because the conditions of one community may differ from those of others, and he thinks the State should be blocked out into so many sections, each section being provided with its own special speed legislation and rules.

The society publishes every two months a complete list of accidents caused by automobiles.

JOS. B. THOMPSON, REPRESENTING THE NEW YORK STATE DIVISION OF THE LEAGUE OF AMERICAN WHEELMEN.

The ordinance on licensing automobilists now before the Board of Aldermen of the city of New York was drafted by Mr. Thompson, who himself holds very strong views as to the necessity for a license law. Mr. Thompson disclaimed all intention of the League of American Wheelmen to take unnecessary measures, and he said that if a bill can be presented in the State Legislature which is constitutional, he and his league will be quite willing to withdraw their measure for a municipal license law. But he said if the automobilists cannot secure a State law that is constitutional, then it is imperative for the League of American

Wheelmen to redouble its efforts in obtaining the municipal license law.

Mr. Thompson said that the Doughty act of 1901, provision of Section 169a, which prohibits the passing of a license ordinance by the municipality, is unconstitutional because it does not provide anything in place of such a law. Further, the present charter of Greater New York, of January 1, 1902, expressly says that the city shall have the right to regulate traffic and issue licenses, thus superseding the Doughty act. Mr. Thompson has no doubt whatever that the city has full authority to pass a license act, but he says that if automobilists would make an honest effort to secure legislation at Albany he would be willing to postpone his own measure.

Mr. Thompson admits that some license regulation is necessary, and he says that it is only a question between themselves and the automobilists as to whether such legislation should be by State or city ordinance.

Personally and from a legal point of view he is in favor of State legislation, but unfortunately the Legislature is not in session. Mr. Thompson has been holding back, hoping that others would take the initiative. He thinks it is a question whether cities will give up the right to regulate traffic in their own streets.

AUTOMOBILE LEGISLATION ABROAD.

FRENCH LAWS.

The Law of March 10, 1899.

1. The present regulations apply to the operation on the public highway of mechanically propelled vehicles, with the exception of those used in the exploitation of railways.

SECTION I.

AUTOMOBILES, WITH OR WITHOUT MOTOR FORECARRIAGE, OPERATED SINGLY.

MEASURES OF SAFETY.

2. The tanks, piping and other parts intended to contain explosive or inflammable substances must be so constructed as not to allow the escape or dripping of any material which might cause an explosion or a fire.

3. The apparatus must be disposed in such manner that its use does not present particular cause for danger and may not frighten horses nor expel noxious odors.

4. The operating devices must be so arranged that the operator may work them without interrupting his view of the road. There must be nothing to interfere with the operator's view ahead; the indicating apparatus which he must watch must be located well within sight and must be illuminated at night.

5. The vehicle must be arranged to respond with certainty to the steering apparatus and turn with facility in curves of short radius. The steering gear operating mechanism must offer all the guarantee of strength desirable. Automobiles the weight of which, empty, exceeds 550 pounds must be provided with means permitting backward driving.

6. The vehicle must be provided with two distinct braking systems, sufficiently powerful, each one of which must be capable of automatically shutting down the motor or of controlling it.

One of these systems, at least, must act directly on the wheels or on drums solidarized with the latter, and must be capable of instantly blocking the wheels. One of these systems, or a special device, must permit stopping all backward motion.

In the case of a motor forecarriage vehicle with fifth wheel one of the braking systems at the command of the operator must act on the rear wheels of the vehicle.

7. Verification that automobile vehicles satisfy the various above requirements will be made by the Department of Mines, on request of the manufacturer or owner. For vehicles manufactured in France the manufacturer must request the verification of all types he has brought out or brings out. For vehicles of foreign origin the examination must be made before the beginning of operation in France, at the locality designated by the owner of the vehicle.

When the official of the Department of Mines delegated to this end has determined that the vehicle presented satisfies the requirements of the regulations, he will draw up a report, a copy of which will be furnished to the manufacturer or owner, as the case may be.

The manufacturer has the privilege of delivering to the public any number of vehicles of any one of the types which have been recognized as conforming to the regulations. He will provide each of these with a number indicating its order in the series of the type to which it belongs, and he must furnish the purchaser a copy of the report and a certificate confirming that the vehicle delivered conforms absolutely to the type.

Each vehicle must bear in plainly legible letters:

(1) The name of the manufacturer, the description of the type and the number in the series of the type;

(2) The name and residence of the owner.

In case the engineers of the Department of Mines refuse to issue a report stating that the vehicle presented satisfies the requirements of the regulations, the applicants may take an appeal to the Minister of Public Works, who will render his decision according to the advice of the Central Commission on Steam Engines.

PLACING IN SERVICE.

8. Every owner of an automobile before placing it in service on the public highway must address to the Prefect of the Department in which he resides a declaration, for which a receipt will be issued to him. This declaration will be forwarded to the Department of Mines without delay.

9. The declaration must state the name and residence of the owner; it must be accompanied by a copy of the report drawn up in accordance with Article 7.

10. A declaration made in one Department suffices for the whole of France.

OPERATION AND TRAFFIC.

11. No person is allowed to operate an automobile who is not the bearer of a driver's license (certificat de capacité), issued by the Prefect of the Department in which he resides, on the recommendation of the Department of Mines. A special license will be issued to operators of motor cycles weighing less than 330 pounds.

12. The operator of an automobile must present at every request of the proper authorities—

(1) His driver's license;

(2) The receipt for the declaration of his vehicle.

13. The various parts of the motor mechanism, the safety appliances, the steering gear, the brakes and their operating mechanism, as well as the transmission gearing and the axles, must constantly be maintained in good condition. The operator must frequently verify by application the good condition of the two braking systems.

14. The operator of an automobile must constantly remain in control of his speed. He must slow down or stop every time the vehicle may become the cause of an accident, of disorder or of hindrance to traffic. The speed must be reduced to that of a man walking in narrow and congested passages.

In no case must the speed exceed 30 kilometres (18¾ miles) per hour in the open country and 20 kilometres (12½ miles) per hour in agglomerations, except as provided for by Article 31.

15. The approach of the vehicle must be signaled, in case of necessity, by means of a horn. Every automobile must be provided in front with a white light and a green light.

16. The operator must never leave a vehicle without having taken the precautions necessary to prevent all accident, all untimely starting and all noise of the motor.

SECTION II.

AUTOMOBILES HAULING OTHER VEHICLES.

MEASURES OF SAFETY.

17. Automobiles hauling other vehicles are not allowed to be operated on the public highway unless they satisfy, as far as the motor mechanism, the transmission, braking and steering devices are concerned, the requirements of Articles 2, 3, 4, 5 and 6 of the present regulations.

18. Independently of the brakes for the automobile, provided for by Article 6, each hauled vehicle must be provided with a system of brakes of sufficient power and rapidity and capable of being operated either by the driver from his seat on the automobile or by a special conductor.

19. The hauled vehicle must bear in

plainly legible letters the name and residence of the owner.

20. An automobile intended to haul other vehicles may only be placed in service in pursuance of a permit of the Prefect, issued upon recommendation of the Department of Mines. The official delegated for this purpose will inspect the automobile and may undertake trials, having for their object to ascertain whether it presents no particular cause for danger, with regard to the service for which it is intended. The permit issued upon the conclusion of these verifications will be good for all departments.

PLACING IN SERVICE.

21. No one is allowed to operate in a Department automobiles hauling other vehicles without a permit issued by the Prefect of that Department, upon the recommendation of either the Chief Engineer of Roads and Bridges or the Chief Road Surveyor, or of these two officials, according to the nature of the roads and highways considered.

The request must state:

(1) The roads and highways the petitioner has the intention to follow.

(2) The weight of the automobile, that of each of the vehicles loaded and the load per axle.

(3) The usual composition of the trains and their total length.

22. The permit will point out the special conditions of safety to which the holder is subjected, independently of the general requirements of the present regulations. The interested parties may take appeal from the decision of the Prefect to the Minister of Public Works, who will render a decision upon the recommendation of the Central Steam Engine Commission.

OPERATION AND TRAFFIC.

23. Every train at night must carry a red light at the rear end, and also the white and green lights provided by Article 15.

24. The speed of trains in motion must not exceed 20 kilometres (12½ miles) per hour in the open country and 10 kilometres (6¼ miles) an hour in agglomerations.

25. When the brakes of the hauled vehicles are not operated by the driver the operation of these brakes is to be intrusted to special conductors, the number of which must be determined in accordance with the importance of the haul and with regard to the declines of the course and the speed of propulsion. In every case efficient means must be provided to prevent backing down hill of the hauled vehicles.

26. The stationing of the trains on the public highway must in no case interfere with traffic, nor hinder access to properties. For public passenger service the stopping points will be designated in the franchise issued by the Prefect.

27. The motion, operation and maintenance of the automobiles and hauled vehicles are subject to the requirements of Articles 11, 12, 13, of the first two lines of Article 14, as well as of the Articles 15 and 16 of the present regulations.

28. The requirements of the present regulations, with the exception of Articles 18 to 28, are applicable to automobiles hauling a voiturette, the weight of which, inclusive of occupant, does not exceed 440 pounds, provided the brakes are capable of efficiently serving for the combination.

SECTION III.

GENERAL DISPOSITIONS.

29. Independently of the requirements of the present regulations, automobiles remain subject to the rules of the surveillance of road carriage.

30. The apparatus constituting the source of energy will be subject to the requirements of the rules regarding apparatus of this kind, now in force or to be adopted.

31. Races of automobile vehicles may not take place on the public highway without a special permit issued by each of the Prefects of the Departments interested, upon the recommendation of the Chief of the Commission of Public Roads. This permit does not relieve race organizers from requesting, at least eight days in advance, for each of the towns interested, the consent of the mayor. The speed may exceed that of 30 kilometres in the open country; it must not in any case exceed that of 20 kilometres in agglomerations.

32. After two violations in a year the driver's license issued in accordance with Article 11 of the present regulations may be withdrawn by a prefectoral act, the bearer being heard, and upon the recommendation of the Department of Mines.

33. Infractions of the preceding rules will be ascertained by reports and referred to the proper tribunals, in conformity with laws and regulations already in effect or to be adopted.

34. The powers conferred upon the Prefect of a Department by the present regulations will be exercised by the Prefect of Police throughout the extent of his district.

35. The Ministers of the Interior and of Public Works are charged, each as far as he is concerned, with insuring the execution of the present regulations which will be published in the *Journal Officiel* and inserted in the *Bulletin des Lois.*

Circular of the Minister of Public Works to the Prefects.

On April 10, 1899, the Minister of Public Works addressed to the Prefects of all the Departments a circular concerning the application of the law of March 10, 1899. This is a very lengthy document, and only the main points set forth will be given here.

It is pointed out that this law in no way modifies the previous regulations regarding road traffic, nor those relating to the use of steam or other sources of motive power. The new law simply adds to these regulations, to cover automobiles, and neither annuls nor modifies them.

An application for the inspection of a machine must be addressed directly to the Engineer of Mines and must be accompanied by a description of the type. This description must, if necessary, comprise drawings or sketches to illustrate and make clear the description, which may be either incorporated in the text or be joined thereto.

By type of vehicle is to be understood not only the nature of the source of energy and the motor system, but especially that of the transmission, braking and steering devices. The same type may comprise vehicles different in dimensions and motor power, provided the differences are not too large to affect the manner in which the vehicle satisfies the various requirements of the law.

The Engineer of Mines must examine the vehicle presented, ascertaining that it complies with all the requirements of Articles 2, 3, 4, 5 and 6. He must have made in his presence trials or demonstrations at various speeds on straightaways and curves. For these trials he will choose a road having the ordinary down grades and on which there is little traffic, and he will interrupt the trial in case of the approach of horses or other animals showing signs of fright, which might become the cause of danger or disorder.

In the trials of the efficiency of the brakes every precaution must be taken to avoid accidents, and yet the trials must be perfectly convincing. The severity of the trials should be gradually increased, and a test at full speed on a decline should only be attempted after the brakes have proved sufficient under less severe conditions. The final test, however, should be sufficiently severe to prove beyond a doubt that the vehicle fully satisfies all the requirements of Article 6, it being borne in mind that the vehicle may have to descend any down grade found in the public highways of France.

When the Engineer of Mines has ascertained that the vehicle complies with Articles 2 to 6, he draws up a report, making use of the description furnished by the petitioner. In general it suffices to add to this description: "It results from trials made on ...... (date) with vehicle No....... (shop number) of type ..... (designation of type), above described, that that type satisfies Articles 2, 3, 4, 5 and 6 of the law of March 10, 1899." This report is dated and signed by the Engineer of Mines, is inscribed with a number denoting the order in the register of that engineer and is then returned to the petitioner after having been approved by the Chief Engineer.

This form applies particularly to the case where the petition emanates from a manufacturer who purposes to furnish vehicles of this type in greater or smaller number to the public.

FORM FOR SINGLE VEHICLES.

The form is essentially the same as in the above case. The declaration must give the full name of the owner, his residence, the name of the manufacturer, the desig-

nation of the type and the shop number in the series of this type.

When the official has ascertained that the declaration is correct and complete he receipts for it by delivering to the petitioner a card, of which a supply is furnished by the Department of Mines. These cards on their face bear the following inscription (translation):

NOTE.

The declaration made in one Department suffices for the whole of France (Article 10 of the law of March 10, 1899).

THE FRENCH REPUBLIC.

MINISTER OF PUBLIC WORKS. DEPARTMENT OF ....

AUTOMOBILE TRAFFIC.

(Law of March 10, 1899.)

RECEIPT FOR DECLARATION.

The reverse side bears the following inscription:

The Prefect of the Department of ......

In view of the law of March 10, 1899, comprising regulations of automobile traffic; and especially the Articles 8, 9 and 10 of that law,

Certifies having received a declaration under date of....................in which M. .... residing at .... declares to be the owner of vehicle with mechanical motor described as follows:

Name of manufacturer: ....

Designation of type:............... Number of order in the series of this type.... ....

The said declaration has been registered at the prefecture under the number........

...., 19..

The Prefect.

After the receipt has been registered on the books kept at the prefecture it is sent, together with the copy of the report accompanying it, to the Chief Engineer of Mines, who is informed of the number under which it has been registered. The Department of Mines will enter the receipt in a special register, which serves the special purpose of taking up census statistics.

DRIVER'S LICENSE.

Applicants for drivers' licenses must pass a practical examination before the Engineer of Mines, or his representative, to furnish proof that they possess the required skill.

This examination on the part of the candidate consists essentially in the operation of a mechanically propelled vehicle of the kind he intends to drive, under the direction of the examiner. The examiner must pass especially on the prudence, composure and presence of mind of the candidate, the correctness of his visual perception, the certainty of his steering, his skill in varying the speed according to requirements, the promptness with which he gets the means for braking and stopping in action in case of necessity and his ideas of the necessities of traffic on the public roads.

The prospective driver of a motor cycle weighing less than 330 pounds need only perform before the examiner until the latter is convinced that the candidate possesses the necessary experience and qualifications.

For the examination of other candidates the examiner takes a seat beside the candidate and has him execute the various manœuvres for starting, stopping, turning curves, changing speed, etc., to ascertain the degree of his skill. He further questions the candidate upon the object and mode of operation of the various levers, pedals, handles, upon the preparatory operations for getting the vehicle in motion, and upon means for remedying on the road the simpler mishaps which may stall the vehicle.

This examination is very important in the case of prospective drivers of steam vehicles. The operation of this kind of machine requires special knowledge and particular attention. The candidate, then, must know the conditions of safety of steam boilers, the function and the mode of reading of the safety appliances with which these boilers are provided according to the regulations, the precautions necessary to verify the indications of these devices and to maintain them in a good state of operation, the preservative measures which must be applied in case of shortness of water, danger of a burst of fire or of excess of pressure.

These rules may be tempered more or less according to the type of boiler, and particularly for those the arrangement of which is such as to have permitted dispensing with the greater number of the safety devices provided for by the regulations concerning steam apparatus.

In general, it will be necessary to specify the kind of motive power of the vehicles the candidate is recognized capable of operating, and sometimes to specify even closer limits by mentioning a definite system of vehicles, the candidate being privileged to extend the scope of his license by submitting to examinations in the operation of diverse vehicles.

Drivers' licenses are issued on regular forms, of which a supply is furnished by the Department of Mines. These forms have the following inscription on their face:

NOTE.

Drivers' licenses delivered by the Prefect of one Department, in accordance with Article 11 of the law of March 10, 1899, are valid in the whole of France.

They may be withdrawn after two infractions (Article 32 of said law).

THE FRENCH REPUBLIC.

MINISTER OF PUBLIC WORKS. DEPARTMENT OF ....

Space for photograph of licensee.	AUTOMOBILE TRAFFIC. (Law of March 10, 1899.) DRIVER'S LICENSE valid for the operation of (1) (1) the vehicles to which the license applies.

The reverse side bears the following inscription:

Number of License: (1).....	The Prefect of the Department of ....
	In view of the law of March 10, 1899, comprising regulations relating to automobile traffic, and particularly its Article 11.
	In view of the recommendation of the Department of Mines,
	Delivers to M. (2).
	Born at (3).
	Residing at (4).
	A driver's license for the operation of (5).
Signature of the Licensee.	Operating under the conditions prescribed in the law above mentioned.
	...., 19..
	The Prefect.

(1) Number in the special register of the Prefecture. (2) Name and Christian name. (3) Place and date of birth. (4) Exact location of residence. (5) Designation of the vehicle or vehicles to the operation of which the license entitles, in accordance with Article 11 of the Ministerial circular of April 10, 1899.

In the driver's license a space is provided for the photograph of the holder. The candidate for license must furnish a copy of his photograph of a size to correspond with the space provided for it, either when making his application for license or when passing his examination. The photograph is pasted on the license before the latter is delivered, and is stamped by the issuing bureau to prevent the substitution of another photograph.

The Chief Engineer keeps a special register of licenses issued, and in case the Prefects issue a license directly to the applicant, istead of causing it to be delivered to him through the Department of Mines, they must inform the Chief Engineer of the number of the license they have delivered.

GENERAL OBSERVATIONS.

The Engineers of Mines will hereafter report regarding the compliance of automobiles with the regulations concerning the use of steam apparatus, and the officials of the Highway Commission regarding the regulations concerning road traffic, in accordance with their previous duties. All violations of the law of March 10, 1899,

judged by police court judges, police "commissaires," etc.

iunicipal or local regulations now become void herewith in all points d by the law of March 10, 1899.

ıw of April 20, 1866, relating to the locomotives on highways is here-ıealed.

ıermits issued previous to this date valid, but the regulations of op-speed and maintenance will here-those prescribed in Articles 23

ıw which I have commented upon, ister concludes, invests in the En-›f Mines considerable authority, not the matters of judgment, but also ion. In the exercise of these new ıey should make efforts to concil-legitimate exigencies of public ıith the rightful convenience of a nteresting industry and which de-ncouragement the more for the hat it is still in its infancy. As in-by the sense pervading the decree h 10, 1899, its liberty should not be d unless more common interests or a higher order necessitate its sac-

ment of the Regulation Re-ling Automobile Traffic.

CREE OF SEPTEMBER 10, 1901.

: 1. Articles 5, 7, 8 and 31 of the March 10, 1899, are modified as

:aph 2 of Article 5 will be revised ws: "Automobiles the weight of mpty, exceeds 770 pounds must be with means permitting backward

ıragraph 3 of Article 7 will be ıe following clause: "The certifi-ıt specify the maximum speed the ile is capable of attaining on the

: same article will be added a para-ıead of the last, thus constructed: .utomobile is capable of running on at a speed superior to 30 kilome-hour it must be provided with two .tion plates, bearing a number, ıust always be placed in evidence ront and the back of the vehicle. nister of Public Works will de-the model of these plates, their attachment and their mode of il-n at night; he will also determine od of issuing these numbers to the d parties."

·ticle 8 will be added a second h thus constructed: "The receipt declaration will state the number to the vehicle or specify that it is ged to carry the plates provided e preceding article."

: 31 will be revised as follows: ›bile races, the routes for which ›rised within a single Department, : be held on the public highway a special permit from the Prefect : recommendation of the Chief of the Highway Commission and with the consent of the mayors of the towns passed through."

When the route of a race is comprised in several departments the permit will be issued by the Minister of the Interior upon the recommendation of the Prefects of the Departments traversed, given with the same formalities as above.

"The speed may exceed that of 30 kilometers per hour in the open country, but must not in any case exceed that of 20 kilometers an hour in agglomerations.

"The expenses of surveillance and others which are occasioned the administration by the race must be borne by the organizers of the same, who to that end must make a previous deposit."

Article 2. Owners of automobiles already declared must within a delay of two months put themselves in communication with the administration to have completed their receipt of declaration in conformity with the modified text of Article 8 of the law of March 10, 1899, by furnishing all the proofs necessary.

The manufacturer of the automobile already declared will be held to complete the certificate furnished by him to a purchaser by specifying in it the maximum speed which the automobile is capable of attaining on the level. Within a delay of another month, from the date of the day that the completed receipt has been remitted to the owner of the automobile, by the Prefect, the owner must, in case of requirement, apply to his vehicle the plates provided for by Article 7.

Article 3. The Minister of the Interior and the Minister of Public Works are charged, each as far as he is concerned, with the execution of the present decree, which will be published in the *Journal Officiel* and inserted in the *Bulletin des Lois*.

An Act of the Minister of Public Works Regarding Plates for Automobiles.

Article 1. The numbers of order to be assigned to automobiles capable of running on the level at a speed greater than 30 kilometres per hour shall be determined by the Chief Engineer of Mines of each mineralogical district. The number shall be inscribed upon the receipt of declaration to be returned to the applicant.

Article 2. This number of order shall be formed by a group of Arabian figures followed by Roman capital letters designating the office of the Chief Engineer. The number will be reproduced on the identification plates in white figures on a dark background, with the following dimensions:

	Front Plate. Inches.	Rear Plate. Inches.
Height of figures or letters...	3	4
Uniform width of stroke.....	.48	.6
Width of figure or letter.....	1.8	2.4
Free space between figures or letters	1.2	1.4
Height of plate..............	4	4.8

The group of figures shall be separated from the letters by a horizontal dash line at half the height of the plate with the following dimensions:

	Front Plate. Inches.	Rear Plate. Inches.
Width (vertically)............	.48	.6
Length (horizontally)........	1.8	2.4
Free space between the dash line and the figures or letters	1.2	1.4

Article 3. The plates shall be located so as to be always in view, in vertical planes perpendicular to the longitudinal axis of the vehicle, the axis of the plate coinciding as nearly as possible with this longitudinal axis.

Article 4. The rear plate must be illuminated at night by reflection with an intensity which permits reading the number at the same distance as by day. Nevertheless at night there may be substituted for the rear plate a lamp which illuminates a frosted glass covered with a plate punched out in such manner that the characters constituting the number appear in light upon a dark ground, with the same dimensions as specified in Article 2.

PARIS, September 11, 1901.

Circular of the Minister of Public Works to the Prefects.

After the amendments to the automobile law of March 10, 1899, passed September 10, 1901, the Minister of Public Works issued another circular to the Prefects of Departments to explain the application of these amendments. This circular is dated September 11, 1901.

In this circular it is explained that the object of the numbers is to identify automobile drivers who make themselves guilty of infractions of the rules. On the other hand the new regulations involve the responsibility of manufacturers, as regards the declaration of the maximum speed the vehicle is capable of traveling at on level road.

It was pointed out in the circular of April 10, 1899, that the description of the vehicle, which must be furnished when application is made for the examination of a vehicle, should state the speed of the type of vehicle submitted for approval. But hereafter special importance must be attached to the speed. A description will no longer be considered complete and precise unless it contains a formal statement concerning the maximum speed the vehicle is capable of attaining on the level, and states the ratio of reduction from motor shaft to driving wheels corresponding to each of the notches on the gear lever sector; also diameter of driving wheels.

The maximum speed of which the vehicle is capable will be stated in the descriptive note as given by the manufacturer; the verification of the Department of Mines will not apply to this factor. However, if the Department of Mines, either in the course of these verifications or otherwise, should arrive at the conclusion

that a vehicle stated not to be able to exceed 30 kilometres per hour is actually capable of exceeding that speed considerably, it will consider the description as manifestly incorrect and as inadmissible.

After this, the Prefects, owing to the changes in the rules, will not deliver the receipt for declaration to the applicants until this receipt has been returned to them by the Chief Engineer of Mines, after having been examined by him with regard to the eventual registration of the vehicle.

After having examined the declaration and documents attached thereto the Engineer of Mines makes mention upon it of its registration, in the space provided for this purpose on the new forms.

If the vehicle is capable of exceeding a speed of 30 kilometres an hour the number assigned to it is recorded in the special register of the mineralogical district; in other cases the word "Naught" is written in the space resrved for the number.

The Chief Engineer of Mines keeps for his entire district a "matriculation register of automobiles capable of exceeding 30 kilometres per hour," which is distinct from the "register of declaration," dealt with in the circular of April 10, 1899.

The matriculation number must hereafter always be recorded in the declaration register. The entry in the register for a "matriculated" vehicle will state:

1. The matriculation number (figure and Roman letter).
2. The full name of the owner.
3. His residence.
4. Name and address of the manufacturer.
5. The designation of the type.
6. The number in the series of this type.
7. The date of approving report of the Department of Mines.
8. The register number of the engineer who issued report.
9. The mineralogical sub-district.

To facilitate the identification a letter is added to the number, representing the mineralogical districts. A table is given in this circular of the various districts, twenty in number, and the letters corresponding to each.

The numbers on the matriculation register must be assigned strictly in succession. These numbers will for the present not be carried beyond three figures. When the number 999 has been assigned a new series will be started with the letter designating the district doubled.

For vehicles already declared the owner must return the receipt for declaration to the prefecture which issued it. If the description originally furnished specifies the maximum speed, and if this speed is beyond 30 kilometres an hour the vehicle may be entered on the matriculation register. If on the other hand, the maximum speed is not given in this description or if the owner wants to contest the legality of the application of this description to his particular vehicle he must produce a supplementary certificate from the manufacturer, which the latter is required to furnish by Article 3 of the law.

In case the manufacturer has gone out of business it remains with the Chief Engineer to judge the correctness of the information given by the owner of the vehicle.

Every old receipt thus returned and completed (if found necessary) by the production of the necessary proofs, will be stamped by the Chief Engineer of Mines at the inside, below on the left, with a special stamp, over the matriculation number or the word "Naught."

Automoibles already declared will be entered on the matriculation register with the new vehicles, without distinction.

The Chief Engineer of Mines will reply to all requests addressed to him by the Government or judicial authorities to furnish certified extracts conforming to the matriculation register.

Hereafter the receipt for declaration, without which no vehicle is allowed to be operated, will contain a statement to the effect that the vehicle is not capable of exceeding a speed of 30 kilometres an hour on the level, or, in the opposite case, give its matriculation number; and in that case the vehicle must carry identification plates.

On account of the importance of this measure mayors and police officials should from time to time verify that each vehicle which should carry the plates actually carries them.

The Chastenet Law.

During the early part of the present year an amendment to the general road laws was introduced into and passed by the French Chamber of Deputies, which is known as the "loi Chastenet." The amendment is intended to provide penalties for the escape of the guilty parties in case of a road accident, and is worded to apply to drivers of all classes of vehicles, but was drawn up with special reference to automobile drivers. The text of the amendment as it passed the Chamber of Deputies is as follows (translation):

"Every driver of a vehicle of any kind (automobile, horse vehicle, bicycle, etc.) who, after an accident to which he contributed by contact, seeks to escape by flight the penal or civil responsibility which he may have incurred, will be punished by six days to two months of prison and a fine of 16 to 200 francs.

"In case there is, in addition, occasion for the application of Articles 319 and 320 of the penal code, the penalties incurred according to the terms of these articles will be doubled.

"Application may be made of Article 463 of the penal code."

This amendment, it was generally supposed, was the outcome of an accident in which a municipal customs official was run over and killed by an automobilist, who made his escape by flight. Considerable excitement was stirred up by the m
in automobile circles; the introduct
the Senate was delayed, and the Au
bile Club de France, after prolong
cussions, proposed the following
tute:

"Every driver of an automobile
kind (automobile, horse vehicle, b
etc.) who, after an accident caused l
by contact to the property of others
flight with the object of escaping re
bility which he may have incurred,
punished by a fine of 16 to 500 fran
case where, in consequence of an a
caused by contact to the person of
there is occasion for the applicat
Articles 319 and 320 of the penal co
penalties inflicted in accordance witl
articles are doubled.

"Application may be made of Arti
of the penal code."

It will be observed that the text pr
for substitution makes a distincti
tween accidents to property and t
son, and provides for a doubling
penalty only in case of personal ac

AN INTERVIEW WITH THE PREFECT OF

M. Lepine, Prefect of Police of
in a newspaper interview has giv
opinion regarding the necessity for
legislation to prevent the recurrence
cidents due to excessive speed. H
the opinion that no such legisla
needed. In Paris, where the polic
is sufficiently large, they are quit
to control the speed of automobil
common sense interpretation of th
lations allows the police to insure
safety without unduly interfering w
automobilists. Should the road b
the vehicles are allowed to travel at
treme limit of speed fixed by the la
the police have also full power to
machine if the crowded condition
streets demands it, even though it b
eling only at 4 kilometres an hour.

In the country the trouble is
much with the law as with the diffi
enforcing it. Accidents due to ex
speed may be expected to continu
all roads are well policed or until a
bilists themselves realize the risks th
and the danger to which they subje
ers by excessive speeding.

GREAT BRITAIN.

At the time when the automobile
ment began to assume considerab
portions in both Europe and Ame
1894 and 1895, motor vehicles were
cally barred from British roads.
were legally classed with traction
as "locomotives on highways," an
required, by an act passed in 1865,
within a speed limit of 4 miles an
the open country, and by anoth
passed in 1878, to be preceded at a
of one-eighth of a mile by a man
a red flag. A number of summons
issued under these acts for pionee
mobilists who brought cars from th

England; but the judges, evidently ing the absurdity of the regula- applied to these vehicles, were nd imposed only very low fines— instance, in one case, and 1s. in

assage of the act of 1896, which ulates automobile traffic in Great has been the cause of great jubi- iong British automobilists, an an- run having been held annually emoration thereof. The same act rly also been the subject of much criticism, as being too restrictive iitable for present conditions.

IGHT LOCOMOTIVES ACT OF 1896.

:t was passed on August 14, 1896. most important provisions will ecounted. The act exempts from ously passed acts restricting loco- on highways all vehicles weighing 3 tons unladen and drawing not n one vehicle, and so constructed smoke or vapor issues therefrom om any temporary or accidental

uncil of any county, the act pro- all have power to make bylaws g or restricting the use of such es upon any bridge within their calculating the weight of a vehi- en the weight of any water, fuel ulators used for the purpose of n shall not be included.
ht locomotive shall travel along a ghway at a greater speed than 14 hour, or than any less speed that prescribed by regulations of the vernment Board.
eping or use of petroleum or of inflammable liquid or fuel for the of light locomotives shall be sub- egulations made by the Secretary

ocal Government Board may make is with respect to the use of light es on highways, their construc- the condition under which they sed.
tions under this section may, if Government Board deem it nec- e of local nature and limited in lication to a particular area, and he application of any local author- bit or restrict the use of such lo- for purposes of traction in streets, or in other places where may be attended with danger to .
ich of any bylaw or regulation der this act, or of any provision ct, may, on summary conviction, ed by a fine not exceeding £10.
d after the 1st day of January r the passing of this act there granted, charged and paid in itain for every light locomotive, liable to duty either as a carriage hackney carriage under Section 4 ustoms and Inland Revenue Act, 1888, an additional duty of excise at the following rate, namely:

If the weight of the light locomotive exceeds 1 ton unladen, but does not exceed 2 tons, unladen, £2 2s.

If the weight exceeds 2 tons, unladen, £3 3s.

Every such duty shall be paid, together with the duty on the license or the locomotive as a carriage or a hackney carriage.

THE LOCAL GOVERNMENT BOARD REGULATIONS (NOVEMBER 9, 1896).

Article I of these regulations simply gives definitions of the expressions "carriage," "horse" and "light locomotive," as used in the regulations.

ARTICLE II.

1. The light locomotive when it exceeds in weight unladen 5 cwt. shall be capable of being so worked that it may travel either forward or backward.

2. The light locomotive shall not exceed 6½ feet in width, such width to be measured between its extreme projecting points.

3. The tires of each wheel of the light locomotive shall be smooth, and shall, where the same touches the ground, be flat and of the width following, namely:

(a) If the weight unladen exceeds 15 cwt., but does not exceed 1 ton, not less than 2½ inches.

(b) If such weight exceeds 1 ton, but does not exceed 2 tons, not less than 3 inches.

(c) If such weight exceeds 2 tons, not less than 4 inches.

Provided that where a pneumatic tire or other tire of a soft and elastic material is used the tire may be round or curved, and there may be upon the same projections or bosses rising above the surface of the tire, if such projections or bosses are of the same material as that of the tire itself, or of some other soft and elastic material. The width of the tire shall, for the purpose of this proviso, mean the extreme width of the soft and elastic material on the rim of the wheel when not subject to pressure.

4. The light locomotive shall have two independent brakes in good working order and of such efficiency that the application of either to such locomotive shall cause two of its wheels on the same axle to be so held that the wheels shall be effectually prevented from revolving, or shall have the same effect in stopping the light locomotive as if such wheels were so held.

Provided that in the case of a bicycle this regulation shall apply as if, instead of two wheels on the same axle, one wheel was therein referred to.

5. The light locomotive shall be so constructed as to admit of its being at all times under such control as not to cause interference with passenger or other traffic on any highway.

6. In the case of a light locomotive drawing or constructed to draw another vehicle, or constructed or used for the carriage of goods, the name of the owner and the place of his abode or business, and in every such case, and in the case of every light locomotive weighing unladen one ton and a half or upwards, the weight of the light locomotive unladen shall be painted in one or more straight lines upon some conspicuous part of the right or off side of the light locomotive in large, legible letters in white upon black or black upon white not less than one inch in height.

7. The light locomotive and all the fittings thereof shall be in such a condition as not to cause, or to be likely to cause, danger to any person on the light locomotive or on any highway.

8. There shall be in charge of the light locomotive when used on any highway a person competent to control and direct its use and movement.

9. The lamp to be carried attached to the light locomotive, in pursuance of Section 2 of the act, shall be so constructed and placed as to exhibit, during the period between one hour after sunset and one hour before sunrise, a white light visible within a reasonable distance in the direction toward which the light locomotive is proceeding or is intended to proceed, and to exhibit a red light so visible in the reverse direction. The lamp shall be placed on the extreme right or off side of the light locomotive in such a position as to be free from all obstruction to the light.

Article III relates to trailer vehicles, brakes on trailer vehicles and the operation of such brakes.

ARTICLE IV.

Every person driving or in charge of a light locomotive when used on any highway shall comply with the regulations set forth, namely:

1. He shall not drive the light locomotive at any speed greater than is reasonable and proper, having regard to the traffic on the highway, or so as to endanger the life or limb of any person, or to the common danger of passengers.

2. He shall not under any circumstances drive the light locomotive at a greater speed than 12 miles an hour. If the weight unladen of the light locomotive is 1½ and does not exceed 2 tons, he shall not drive the same at a greater speed than 8 miles an hour, or if such weight exceeds 2 tons, at a greater speed than 5 miles an hour.

Provided, That whatever may be the weight of the light locomotive, if it is used on any highway to draw any vehicle, he shall not under any circumstances drive it at a greater speed than 6 miles an hour.

Provided, also, That this regulation shall only have effect during six months from the date of this order, and thereafter until we otherwise direct.

3. He shall not cause the light locomotive to travel backward for a greater distance or time than may be requisite for purposes of safety.

The New Bill Before the British Parliament.

"A bill to provide for the registration of motor vehicles and to amend the Locomotives on Highways Act, 1896.

"1. After the commencement of this act any person driving or assisting to drive a vehicle as herein defined on a public highway shall, unless some person is registered as owner thereof, and unless such vehicle bears thereon a number or such other mark of identification as may be prescribed, be guilty of an offense punishable summarily.

"2. In addition to the powers conferred by the Locomotives on Highways Act, 1896 (hereinafter called the principal act), and notwithstanding anything in the said act contained, the Local Government Board may make regulations:

"(1.) Prescribing the conditions under which and the mode in which and the places where the registration and numbering of such vehicles may be effected and the persons (residing in the United Kingdom) also may be registered as owners of such vehicles.

"(2.) Fixing a sum not exceeding 5s. per annum for each vehicle, which shall be charged and paid to the County Council in whose district the license is granted as duty or license in respect of such registration and which duty shall be levied and dealt with as the additional duty imposed by the principal act, such license money to be applied in aid of the highway fund of such County Council.

"3. The person proceeded against for breach of any bylaw or regulation made under this or the principal act or of any provision of such acts may appeal to the Court of Quarter Sessions.

"4. 'Vehicle' shall mean and include any vehicle referred to as light locomotives in the principal act as well as any vehicle propelled by mechanical power if it is designed to carry its load upon its own platform, and does not exceed, including such load, a total moving weight of 14 tons, or when used for the purpose of drawing one vehicle does not exceed a joint total moving weight of 20 tons, and which is so constructed that no smoke or visible vapor is emitted therefrom, except from any temporary or accidental cause.

"5. The Locomotives on Highways Act, 1896, is to be read as one with this act, except Section 4, which is hereby repealed.

"6. This act may be cited as the Locomotives on Highways Act, 1902, and shall come into operation on January 1, 1903."

Automobile Legislation in Germany.

Germany at present has no uniform automobile law valid for the whole country. The first regulations relating to automobile traffic were issued on April 15, 1901, by the Chief of Police of Berlin, and are in force in the police district of Berlin. Following are some extracts from these regulations:

Motor vehicles must be of safe construction; they must not produce abnormal noise nor emit annoying smoke and steam or noxious fumes. The exhaust to the atmosphere of steam or gas must take place at an inconspicuous point.

The steering mechanism must be easily controllable and permit the vehicle to be turned on streets 33⅓ feet in width, and motor cycles on streets or passages 10 feet in width.

Automobiles must be provided with two systems of brakes independent of each other, each of which is capable of bringing the vehicle to a standstill when running at a speed of 15 kilometres (9.4 miles) per hour on level asphalt road in a distance of not more than 8 metres (27 feet). For motor cycles one brake satisfying this requirement is sufficient.

Every motor vehicle must carry a horn giving a distinctly recognizable alarm, yet not too loud and annoying to the public. Exceptions may be made for motor fire engines, etc.

Every automobile must be equipped with two side lights which throw a white light ahead; they must be of sufficient intensity to permit of seeing the road ahead, a distance of at least 20 metres (66⅔ feet).

Every automobile must be provided with a plate bearing the name of the manufacturer, the horse power of the motor and the weight of the vehicle.

POLICE REGULATIONS.

Every automobile operated upon the public streets within the police district of Berlin must be provided with an identification number and a designation of the police district in which the number was issued. The number plates must be attached either to the back or to both sides of the vehicle, must be plainly legible and illuminated at night.

In the case of vehicles used only temporarily in the police district of Berlin the above regulations are not applicable, provided the owner can furnish proof from the proper authorities that he has complied with the regulations in his home district. Documents of this kind issued in foreign countries must be indorsed by a German Government official.

Local police authorities are entitled at any time to make an investigation of the safety of the vehicle and to demand a demonstration of the vehicle. Vehicles which do not satisfy these requirements may be temporarily or permanently excluded from the highways, in addition to the punishment of those responsible.

QUALITIES AND DUTIES OF DRIVERS.

Operators of automobiles must be perfectly familiar with mechanical constructions and their operation and must provide themselves with a certificate certifying this, issued either by a Goverment office, a driver's school under Government inspection, or an officially recognized expert. This certificate must be submitted to the local authorities at the home of the holder and be suitably marked by these authorities. Drivers' licenses issued in foreign countries are valid only if they are indorsed by a German Government official.

Drivers who have violated the rules relating to the duties of drivers may be deprived by the police of the right to drive motor vehicles for a certain time. The police authorities may demand the return of the driver's license.

The driver must always, when operating a vehicle, carry with him the receipt of registration of the vehicle and his driver's license, which he must present to the authorities upon request.

Local authorities reserve the right to close certain streets to automobiles. Footpaths which are open to bicycles may only be made use of by motor cycles in case of special permission by the police.

The speed of automobiles at night or within built up parts of a city must not exceed that of a lively horse trot (about 15 kilometres per hour). Outside of built up portions on straight roads with a free view ahead the speed may be suitably increased.

Races on public roads, streets and places require the permission of the local police, and in case they extend beyond the limits of a single police district, the permission of the provincial police authorities.

The speed must be reduced to that of a slow trot in all places where there is a dense traffic, on bridges, in narrow passages, on steep descents, at turns, etc.

At dark and during a dense fog the lamps must be burning.

The driver must notify of his approach all other users of the road which he is about to overtake or meet, by a distinctly audible signal, and must drive slowly and stop if necessary to avoid accidents. The signaling must be stopped immediately if it causes horses to become restive or to shy. Aimless or annoying signaling is to be avoided.

If the driver notices that a horse or other animal shies at the automobile or that otherwise the passing of the automobile subjects man or beast to danger he must reduce the speed of the vehicle and stop if required. Motor vehicles propelled by steam must not exhaust into the atmosphere in such manner as to cause the shying of cattle or other disorder.

At the command of a policeman on duty the driver of an automobile must stop at once.

In case the driver leaves his vehicle he must shut down the machine or otherwise disengage the driving mechanism and apply the brake; he must also take the necessary precautions to prevent the vehicle from being started by unauthorized parties.

(The formalities of registering the vehicles are essentially the same as in France.

at the registration is attended to
olice Department instead of the
:nt of Mines).

ɔruary 24, 1902, the chief of po-
ɛrlin issued a number of amend-
ı the above regulations, which
ɔ force on April 1, 1902. These
nts relate to the identification

ɛntification sign for Berlin com-
ɛ Roman letter A and the regis-
umber assigned. The letter and
are inscribed directly upon the
:l of the vehicle or upon a plate
to the vehicle by screws with
ınk heads, the plate having a
ıurface and the inscription being
upon white ground. No orna-
ı of the letters or background is
The figures must be 4.8 inches
the thickness of base lines .8
e letter A is to be above the num-
an intervening space of .8 inch.
tions based upon those in force
have been issued by the police
:s of Hanover, Munich and other
'ery recently the system of regis-
ıaugurated in the police district
has been extended to cover the
ingdom of Prussia. Each of the
ovinces is designated by a letter.

ıbject of automobile regulations
ıght up in the Reichstag at the
ıf February 11, 1902. The mem-
e house of representatives, Malt-
ıanded speed restrictions, the in-
n of a system of examinations for
nd particularly an imperial regu-
responsibility in case of accident
ıobile traffic, by an extension of
rial law concerning responsibility
nts.
ɛcretary of State, Nieberding, re-
ting that issuing general, uniform
ıs for automobile traffic was a
ɔr the consideration of the police
ıort and did not concern the im-
ourts of justice. Whether it
ssible, and promising, to at-
ı secure uniform regulations by
statute, he was unable to
at was for the Secretary of
:rior to decide, and he would
he latter of the wishes of the pre-
eaker. As regards the extension
nperial law concerning responsi-
accidents to automobile traffic, the
statute reserved this question for
n by the state authorities. The
acknowledged, however, that in
the enormous development of au-
traffic the question arose
it would not be best to adopt
regulations for the whole empire.
ıd been of the opinion that that
r state which had the most ex-
in this matter, namely, Prussia,
call for making suitable recom-
ɔns. An inquiry had revealed, however, that Prussia thought the time not yet ripe to take this step. He would keep track of the matter, however, and attempt at the proper time to secure a remedy.

There has been considerable agitation in German automobilist circles for favorable regulations uniform for the whole empire. A meeting was held in Dresden on December 19, 1901, at which the various questions were discussed and the subject was also dealt with at the third German Automobile Congress at Eisenach in June. We understand that with the assistance of the "Deutscher Automobil Verband" (corresponding to our A. A. A., and comprising sixteen clubs) a draft is now being made of imperial regulations which will probably be introduced in the Reichstag the coming winter.

The Italian Automobile Law.

The main points of the automobile law which went into force in Italy in 1901 are the following:

All automobiles for use on the public highway must be submitted for inspection and trial according to standards to be determined by the Minister of Public Works, and the expenses of such trials must be borne by the manufacturers or the agents through whom the vehicles are imported into the Kingdom. The Minister of Public Works will issue certificates for types of automobiles which relieves the manufacturers or agents from presenting for trial all vehicles which are exact duplicates, in the disposition of the mechanism as well as in weight of the vehicle for which the certificate was issued; the certificate must then be reproduced by the manufacturer and provided with series numbers.

Every vehicle must be presented for trial anew every time important repairs or changes are made, and must be again presented for trial four years after date of previous trial, even if it has not been in use.

The inspection and trial are conducted by the chief of the Bureau of Engineering or his representative.

Vehicles must be equipped with two independent brakes, a signalling device of a kind to be specified by the Minister, a white and a dark green light in front and a red light behind.

Every driver must procure a license, which is issued by the Prefect of the province in which the applicant resides, the license to state the place of residence of the applicant and to certify that he is over eighteen years of age. The Prefect having acknowledged the validity of the documents presented, forwards them to the Bureau of Engineers, which latter apoints a day and place for the examination of the applicant. The examination is both experimental and oral. If the applicant passes the examination the Bureau of Engineers issues to him a booklet, containing his protograph and signature and space for making records of any eventual infractions.

The speed of automobiles must not exceed 25 kilometres (15.6 miles) per hour in the open country, and the speed of a horse trot (about 15 kilometres or 9.4 miles) in built up districts. At night the speed in the country must not exceed 15 kilometres per hour, and may only be augmented above this limit on straight roads with a free view ahead. Municipal authorities may reduce the speed limits within their territory.

Speed trials of automobiles may not take place on the public roads except with a special permission from the Prefect, indorsed by the Bureau of Engineers. In case the race leads through two or more provinces, the permit is issued from the Prefect of the province in which the start is to take place and submitted to the Prefects of the other provinces for their approval. In case of disagreement the Minister of Public Works makes a decision.

Vehicles weighing over 800 pounds must be provided with backward driving gear. Trailer vehicles must have two independent brakes.

Each vehicle must carry at the rear a metal plate inscribed with the license number and the province in which the license was issued.

Operating automobiles without a license is punishable with a fine of 10 to 300 lire. Any violation of the present regulations, with a fine of from 20 to 600 lire.

AUTOMOBILE LEGISLATION IN THE UNITED STATES.

NEW YORK STATE.

Comparatively few counties and towns in this State have adopted special legislation, relying almost generally upon the existing State law. The reports almost entirely are that adverse feeling against automobiles, in parts where it existed, is rapidly dying out.

State Law, Signed April 25, 1901 (Condensed).

The owner of a carriage, propelled by steam, shall not allow the same to pass over any public highway or street, except upon railroad tracks, unless such owners shall send before the same a person of mature age at least one-eighth of a mile in advance, or shall notify and warn persons traveling such highway or street, with horses or other domestic animals, of the approach of such carriage; and at night such person shall carry a red light, except in incorporated villages and cities. (This section shall not apply to any carriage or motor vehicle, propelled by steam, developing less than 25 horse power, other than a steam traction engine.)

The commissioners or other authorities having charge of any highway, public street or park shall have no power to pass any

ordinance or regulation by which any person using a bicycle or tricycle, an automobile or motor vehicle, shall be excluded or prohibited from the free use of any highway, public street, etc., at any time when the same is open to the free use of persons using other pleasure carriages, except upon a driveway, speedway or road expressly set apart by law for the exclusive use of horses and light carriages. The board of supervisors of any county may adopt ordinances regulating the speed of automobiles or motor vehicles on the highways or streets of such county, outside the limits of cities. No ordinance or regulation adopted by the authorities of any municipality in pursuance of this section or of any other law shall require an automobile or motor vehicle to travel at a lower rate of speed than 8 miles per hour within any city, town or village of the State in the built up portions thereof, nor at a slower speed than 15 miles per hour where the same are not built up. An ordinance adopted by a board of supervisors in pursuance of this section, regulating the rate of speed of automobiles on the highways or streets of such county outside of cities shall supersede any such ordinance in such county adopted by the authorities of a town or village. But nothing herein shall prevent the passage of any regulation, ordinance or rule regulating the use of bicycles or tricycles in highways, etc., or the regulation of the speed of carriages or automobiles in public parks and upon parkways and driveways in the city of New York, under the exclusive jurisdiction and control of the department of parks of said city, nor prevent any such authorities in any other city from regulating the speed of any vehicle herein described in such a manner as to limit and determine the proper rate of speed with which such vehicles may be propelled, nor in such manner as to require or prohibit the use of bells, lamps and other appurtenances, nor to prohibit the use of any vehicle upon that part of the highway known as the footpath or sidewalk.

Every owner of an automobile shall, within thirty days after the amendment to this section takes effect, file in the office of the Secretary of State a statement of his name and address, with a brief description of the character of such vehicle, and shall pay to the Secretary of State a registration fee of $1. The Secretary of State shall issue to such person a certificate, stating that he has registered in accordance with this section, and shall cause the names of such persons to be entered in alphabetical order in a book kept for such purpose. Every person hereafter acquiring an automobile or motor vehicle shall, within ten days after acquiring the same, register with the Secretary of State as required by this section. This section shall not apply to a person manufacturing or dealing in automobiles or motor vehicles, except those for his own private use.

No person driving an automobile on any street, etc., in this State, shall drive same at any speed greater than is reasonable and proper, having regard to the traffic and use of the highway, or so as to endanger the life or limb of any person.

Every automobile shall be provided with good and efficient brakes, and shall also be provided with a suitable bell, horn or other signal. Every automobile shall be so constructed as to exhibit during the period from one hour after sunset to one hour before sunrise two lamps showing white lights visible within a reasonable distance in the direction toward which the automobile is proceeding, and shall also exhibit a red light visible in the reverse direction. The lamps shall be so placed as to be free from obstruction to light from other parts of said automobile.

Every person driving an automobile shall at request or signal by putting up the hand from a person driving or riding a restive horse cause the automobile to immediately stop and to remain stationary, so long as may be necessary to allow said horse to pass. This provision shall apply to automobiles going either in the same or in an opposite direction.

Any person owning or operating an automobile except such as are used for public hacks, trucks or other vehicles for hire, shall not be required to obtain any license or permit pursuant to the provisions of any local or municipal resolution or ordinance, or the rules or regulations of any commissioners, or other authorities having charge of any highway, etc., or pursuant to the provision of any municipal charter or any other statute, except as herein contained. Every such automobile shall have the separate initials of the owner's name placed upon the back thereof in a conspicuous place, the letters forming such initials to be at least 3 inches in height.

The penalty for violating any of the provisions of the law relating to automobiles shall be not exceeding $25.

THE COCKS LAW.

SEC. 666. A person driving any vehicle upon any public highway, who unjustifiably runs the horses, or who drives an automobile upon any public highway within any city or incorporated village, at a greater rate of speed than 8 miles per hour, except where a greater rate of speed is permitted by the ordinance of a city, or upon any public highway outside of any city or incorporated village at a greater rate of speed than 20 miles per hour, or upon any bridge at a greater rate of speed than 4 miles per hour, is guilty of a misdemeanor, and shall be fined for the first offense not exceeding the sum of $50, and for the second offense not exceeding $50, or by imprisonment for a term not exceeding six months, or both.

New York City Licensing Ordinance.

(Now Pending.)

Following are the chief provisions of ordinance 1066, introduced by Alderman Peck:

No person shall hereafter operate any ...bile until he has obtained a license to operate same. The mayor shall ...nate three competent persons, who ... hold office for two years and sh... known as the Board of Examiners c... tomobile Operators, who shall careful... amine every applicant for a license ... such person's general and special fitn... operate such vehicle and make their v... report to the mayor. Said board ... adopt such rules and regulations f... performance of the duties imposed u... as it shall deem necessary, and shal... stated meetings in one of the public ... ings of said city. They shall keep an ... rate record of all their proceedings, a... salaries of the members of said boar... be paid monthly, out of the money... for licenses.

Persons desiring a license shall ... written application to the Bureau ... censes, in such form as said board ... specify. Such application shall be re... to the board of examiners, who sh... point a time and place for hearing th... and the secretary of said board shall ... the applicant thereof; the applicant ... personally appear before the said bo... the time designated and shall submit ... amination. The board in its report ... state whether the application is ap... or rejected, and if rejected, the ... therefor. Such report shall forthw... forwarded to the mayor for approval ... jection. If approved, and if the re... in favor of granting the license, th... reau of Licenses shall at once issue ... cense, which shall be good for on... from its date unless sooner suspen... revoked. If the report of the bo... against granting the license and if su... port is approved, no license sh... granted on such application; if the ... shall disapprove such report rejectin... application the same shall go back ... board of examiners for further heari...

All licenses shall be by authority ... mayor, and be issued by the Bur... Licenses; they shall be good for on... from date of issue unless sooner re... or suspended, and may be renewed ... year to year, either with or without f... examination, as the board of exa... may determine, on payment of o... the sum paid the first year. The ... shall have power, after a hearing, ... voke the license. A license is not tr... able, and must be produced wh... required by an officer of the city.

Licenses shall contain the name a... dress of the licensee, and state the k... vehicle to be operated, with a suffi... definite description; and shall be nu... and registered by the Bureau of Lice... a book provided for that purpose, o... inspection by the public. The vehicl... be equipped with two lamps, and ... shall be securely fastened acros... middle of the outside of each lamp a ... band not less than 2 inches in ... out of which the official numbers ... license shall be cut; the figures sh... be less than $1\frac{1}{2}$ inches high, and the

: kept burning from one-half hour ınset.

all be sufficient cause for revoking ense that the holder has violated ed regulations or willfully violated ıer law relating to the use of auto-;, or has allowed his vehicle to ınattended on any public places or to display his license to officers.

fee to be paid for licenses for any vehicle intended to carry one or rsons is $3; if intended to carry ıan two persons, $5. For any vehi-ated for private use, $10.

person operating any vehicle with-ıt obtaining a license, or violat-y of the other provisions of this ce, shall for each offense be fined ; than $10 nor more than $50, or : imprisoned not less than two days e than ten days, or shall suffer both l imprisonmeut.

ing in this ordinance shall be con-ıs applying to motor cycles.

Oatman (New York City) Ordinance.

(Pending.)

is an ordinance relating to "Rules Road," which was on February 4, ferred to the Committee on Laws gislation. Under the head "Regu-f Speed," this ordinance states:

following rates of speed through ets of the city shall not be ex-That is, 10 miles an hour by bicy-cycles, velocipedes, motor vehicles et cars, however propelled; 8 miles enger and pleasure vehicles drawn s or other animals, and 5 miles an all other vehicles."

this ordinance was reported upon Committee on Laws and Legislation, an Parsons offered a number of ents to it, one of which substitutes for 10 miles in the above clause re-speed.

er amendment relates to penalties ıtion. The original ordinance fixed ; at "not less than $1 and not ex-$10." The amendment provides person driving any vehicle * * * drives an automobile * * * at a rate of speed than 8 miles per hour of a misdemeanor, and shall be the first offense not exceeding the $50, and for the second offense not ıg $50 or by imprisonment for a t exceeding six months or both."

LO—Ordinance in force December , limits speed of all vehicles to 8 r around corners and at intersec-streets, 5 miles; ordinance includes reet regulations; penalty. $5, or ment for five days. A special or-governing automobiles is before d of Councilmen, the upper house, een passed by the Board of Alder-: lower house. It confines the 8 it to the business streets, and per-miles outside. Vehicles must not be left standing on Main street, between Seneca and Exchange streets, longer than fifteen minutes; must not be left on other streets longer than ten minutes. Penalty remains the same.

YONKERS—Ordinance of May 16, 1900, 8 mile limit; penalty, $5 to $25.

NIAGARA FALLS—General vehicle ordinance limiting speed to 12 miles.

GENEVA—Now contemplating special ordinance.

BINGHAMTON—Now contemplating special ordinance.

UTICA—No special law at present, but one in contemplation.

RIVERHEAD—The District Attorney has advertised and posted notices of reward for conviction of automobile drivers who operate beyond speed limit of the Cocks law.

ROCHESTER—Ordinance limits speed within 1 mile of intersection of State and Exchange streets with Main street to 6 miles; otherwise within city to 8 miles. Must carry two lamps and a gong or bell. There is a strong feeling against scorching by motor vehicles.

OSWEGO—Limit of speed for all vehicles on streets and across bridges, 6 miles.

BINGHAMTON—An ordinance has just been passed limiting speed in the built up portion to 8 miles an hour, in parks to 5 miles and in other parts of the city to 15 miles. It requires good brakes, a bell, whistle or other signaling device, two lamps and initial plates. Automobiles must stop upon signal from driver of restive horse and remain stationary until the latter has passed; fine, not to exceed $25.

BUFFALO—A committee of the councilmen have agreed to recommend a speed limit of 12 miles an hour outside a limited district comprising the business part of the city.

UTICA—The police have been instructed to rigidly enforce the State automobile law.

YONKERS—Chief of police has directed every policeman to arrest every trolley motorman and every automobile driver going over 8 miles an hour.

MASSACHUSETTS.

STATE LAW APPROVED APRIL 17, 1902 (CONDENSED).

No automobile shall be run on any public highway outside the limits of a city at a speed exceeding 15 miles an hour, and on any public way within the limits of a city at a speed exceeding 10 miles an hour.

Every person having control of a motor vehicle shall, whenever approaching any vehicle drawn by horses, operate and control such automobile in such manner as to exercise every reasonable precaution to prevent the frightening of any such horses. And if such horses appear frightened the person in control of such motor vehicle shall reduce its speed, and if requested by signal or otherwise by the driver of such horses, shall not proceed farther towards such animal unless such movement be necessary to avoid accident or injury, or until such animal appears to be under the control of its rider or driver.

Upon approaching a crossing of intersecting ways, and also in traversing the crossing, the person in control of a motor vehicle shall run it at a rate of speed less than that above specified, and not greater than is reasonable and proper, having regard to the traffic and the use of the intersecting ways.

Any person violating any provision of this act shall be punished for each offense by a fine not exceeding $200, or by imprisonment for a term not exceeding ten days, or by both such fine and imprisonment.

This law does not deprive local authorities of the privilege to reduce the speed limit in their territory if they see fit, and the speed limit in some cities is lower than 10 miles an hour.

WALTHAM—Ordinance limits speed to 8 miles an hour "except in such places as the superintendent of streets may determine." cussion by town council.

WARREN—Voted that the speed of automobiles be regulated by the selectmen.

WEST NEWTON—Only State law in force. There have been several arrests for fast driving, but they have usually been discharged on the payment of a small fine.

CHICOPEE—An ordinance enacted last December limits speed to 12 miles an hour and 5 miles an hour on the bridge over the Connecticut River at Chicopee Junction and the bridge over the Chicopee River at Chicopee Centre. Ordinance requires a suitable bell and a lamp. Penalty, not to exceed $100 or ten days' imprisonment or both. The speed limit, of course, conflicts with the limit of the State law, and is therefore void.

ADAMS—Bylaws fix speed limit at 8 miles an hour.

SOMERVILLE—Ordinance speed limit is 10 miles, the same as the limit of the State law.

NORTH ADAMS—Speed limit, 8 miles an hour.

BEVERLY—Ordinance speed limit, 10 miles an hour. One conviction under this ordinance leading to fine of $25.

NEWTON—Ordinance speed limit, 10 miles an hour; fine, not to exceed $20.

NEWBURYPORT—An order to appoint a special committee to regulate the speed of automobiles and street cars recently passed the upper branch of the City Council, but was tabled.

CAMBRIDGE—There are several propositions before the City Council with regard to automobile speed regulations.

LENOX—Speed is limited to 8 miles an hour in town districts.

CHELSEA—Ordinance limits speed to 8 miles an hour; fine, not to exceed $20.

There is a rather strong anti-automobile sentiment in some parts of Massachusetts, notably in the towns of Lenox, Spencer, Beverly and Manchester. In the last

named place many arrests have been made for reckless driving.

CONNECTICUT.

Revised Statutes, Section 2,089 (Condensed).

No motor vehicle shall be run on any highway outside the limits of a city at a speed to exceed 15 miles an hour, and within the limits of any city at a speed to exceed 12 miles an hour. Upon approaching a crossing of intersecting streets or roads the driver shall have such vehicle under control, and shall reduce the speed until said crossing shall have been passed. Upon meeting or passing any vehicle drawn by a horse the driver shall reduce the speed, and if the horse drawing said vehicle appears to be frightened the person in charge of said motor vehicle shall cause it to come to a stop.

No city, town or borough shall have any power to make any ordinance, bylaw, or resolution respecting the speed of motor vehicles, and no ordinance, bylaw or resolution heretofore or hereafter made by any city, town, or borough in respect to motor vehicles shall have any force or effect. The mayor of any city, the selectmen of any town, or the warden of any borough may, upon any special occasion, or whenever in their judgment it may be deemed advisable, grant permits to any person or persons or to the public to run such motor vehicles during a specified time or until such permit is revoked, upon specified portions of the public ways or highways of such city, town or borough, at any rate of speed, and may annex such other reasonable conditions to such permits as they may deem proper. Any person violating any of the provisions of this section shall be fined not more than $200 for each offense.

There are no sectional laws in any part of Connecticut. In Hartford there has been one arrest of two automobilists out of town, owing to fast driving, who were condemned each to a fine of $50. Automobiles are said to be dreaded by the public.

Stamford—One arrest; fine, $50. No objection to automobiles if properly handled.

New Haven—Two men have been killed by automobiles in New Haven County within the last four months, and four young men are under arrest charged with manslaughter. Consequently there is considerable feeling against automobiles and stringent regulations are favored.

There have been no arrests in any other part of the State, and the population is reported as regarding automobiles with indifference, except in Middletown, where the feeling is rather favorable.

NEW JERSEY.

Englewood—Eight mile limit; two arrests and convictions; fine $5; maximum penalty since raised to $100; no anti-automobile feeling in Englewood or vicin

Hackensack—Ordinance July 7, 1902; 8 mile limit; lamps after dark; alarm signal required; must stop on request of horse driver; owner's initials on vehicle; persons under eighteen cannot operate; penalty, $50 and costs, or, in default, imprisonment not exceeding twenty days; ordinary rules of the road included in the ordinance, and non-observance punished by fine of $10, or, in default, imprisonment for not exceeding ten days.

Fort Lee—Speed limit, 8 miles; penalty, $10.

Gloucester County.

Ordinance August 21, 1902, limits speed to 12 miles, in villages, towns, etc., to 8 miles, and when passing teams to 5 miles; if horse shows fright, must stop; must use alarm; penalty, $50, and, on failure to pay, fifteen days in jail; no arrests up to date.

Trenton—Ordinance now pending; considerable feeling against automobiles, due to lack of judgment and common sense on part of operators.

Bordentown—Is contemplating an ordinance.

Lawrenceville—Speed limit 12 miles; penalty, $10 to $15; this is on high road between New York and Philadelphia.

Essex County.

Ordinance limiting speed in cities of first and second class and in towns, to 8 miles, and in townships to 15 miles; turning corners speed not to exceed 4 miles; penalty $10 for first offense, $25 afterward; lamps after dark, penalty $5; efficient brakes required, penalty $5; registration with county clerk required, penalty $10; infraction of ordinary rules of the road punishable with fine of $5.

Newark—Ordinance of August 21, 1902; limit 8 miles, turning corners 4 miles, first offense $10, subsequent offenses $25; must sound alarm when within 100 feet of pedestrian or vehicle, penalty $5; must keep to left, overtaking or passing, and take reasonable precaution to avoid danger, penalty $5; automobiles used in Newark must be registered with county clerk, penalty $10; in case of accident must stop and give name and address, penalty $10.

Camden County.

Ordinance November 13, 1901, limits speed to 10 miles; must stop for frightened horse; automobiles to be registered with county clerk and display number; must carry lamp after nightfall; penalty, $20 and costs.

Freehold—Ordinance, September 1, 1902, limits speed to 6 miles; must use alarm; must show light from one hour after sunset to one hour before sunrise; penalty, $10 for first offense, $20 subsequent offenses; imprisonment for thirty days on failure to pay.

Shrewsbury Township—Ordinance June 24, 1902, limits speed to 12 miles; penalty, first offense, $10; subsequent offenses, ·; must stop upon request to avoid accidents; penalty for refusal, $10 subsequently.

Red Bank.—Speed limit, 6 provisions same as Shrewsbur

Keyport—Speed limit, 8 mil

Madison—Speed limit, 8 between one hour after sunset must use alarm; penalty, $1 costs, or, in default, imprison to thirty days; strong anti-aut ing in this section.

Morristown—Ordinance of 1900, amended October 4, 190 fine of $250 for exceeding spe miles, or for failure to carry b about a dozen arrests and cor

Atlantic County

Ordinance August 6, 1902, li 10 miles; lamp after dark; n request for frightened horse;

Hammonton—Ordinance, D 1901; speed limit, 10 miles; or imprisonment for ten da friendly feeling in Hammonton except when scorching is indulg

Atlantic City—Ordinanc speed to 10 miles on streets inlet and ocean on northeast e Florida avenue, and 12 miles in of city; alarm when approachi tions of streets between the inl ida avenue; light after dark; exceeding $200; or, in defaul ment not exceeding ninety days

Passaic—No ordinance in fo projected; general ordinance l to gait no faster than a mo penalty, $5 with costs.

Paterson—Is preparing ordin

Somerville—Agitation now for speed regulation.

Morris County—Counsel of of freeholders has been instruc pare an ordinance limiting spe over county roads.

Gloucester—City council a meeting will be asked to limit s tomobiles within city limits.

PENNSYLVAN

South Bethlehem—Ordinan cember 17, 1900, limits speed t penalty, $10.

Eaton—Ordinance of June limits speed to 10 miles; penalty

Reading—Legislation in cont

Erie—Ordinance of Septemb limits speed to 10 miles, and a tersections, 5 miles; must car gong; penalty, $10 to $50; or, imprisonment from ten to thirt

Pittsburg—Ordinance introdu cil limits speed to 6 miles in b and 10 miles outside; penalty, to $100.

Automobiles are taxed under v nance, a single seated vehicle num, and vehicles with more th $10 per annum.

Philadelphia—Bill now penc councils provides for inspection

e of licenses; limits speed to 7 portion bounded by Vine street, reet, Sixteenth street and the Del- iver, and within the built up por- uburban wards; 10 miles within all ts of the city, excepting north of iue, south of Porter street, west of ond street, where 15 miles is per-

must be reduced to 5 miles, 8 miles respectively, when passing iicles.

ight lamps one hour after sunset. must not leave vehicle before sub- ise of motor.

vehicles must have solidly con- steering gear. If the weight is o pounds, must have reversing m; must have good and sufficient suitable bell, horn or other signal; re means to condense or prevent iry escape of steam or vapor, also mufflers to prevent unnecessary

es will be examined and license for fee of $2, including cost of ing number.

anufacturer or owner of machine ied $50 if all requirements are not and $75 for subsequent offenses. for violation of any provision of iance by person operating the ve- $10; in case of second violation, be suspended, in addition to fine, nore than thirty days; for third n addition to fine, license sus- r three months; thereafter, license ispended indefinitely.

is only required when driver re- thin city limits longer than forty- rs.

URG — Ordinance now pending speed to 7 miles, also requiring lights; penalty, $25 or imprison- thirty days in default.

—An ordinance has been intro- iting speed of automobiles to 7 hour; fines, $25, $50 and $100 for nd and third offense respectively.

OHIO.

US—Ordinance of June 16, 1902, ed in business streets to 7 miles; 12 miles; penalty, $5 to $50, or ent for not more than thirty

for not having lamp and signal, ding $50.

—The town council is contem- ordinance regulating all vehicles.

LE—Ordinance limiting speed to

arry bell or whistle and lamp; fine, $25 and costs.

—Ordinance of July 7, 1902, ed to 10 miles.

, fine of not more than $50, or ent for not more than thirty

—Ordinance limiting speed to and requiring light after dark.

MADISONVILLE—Ordinance limiting speed to 5 miles.

GREENVILLE—Speed ordinance, also regulating equipments, passed; no particulars.

OBERLIN—Ordinance contemplated.

ELYRIA—Relies on State law, which requires automobiles to give two-thirds of road to teams.

DAYTON—Ordinance limits speed to 8 miles.

Must have gong or bell, and at night two lighted lamps.

Must stop for frightened horse.

Penalty, $25 and costs.

CLEVELAND—Must register with city clerk, fee $1, and carry numbers.

Does not apply to first visit of one day.

Speed limit, 7 miles inside business radius of ¾ mile; outside, speed limit, 15 miles; must stop on signal of horse driver.

Must carry bell or horn and lamp.

Penalty, not exceeding $100.

To head off any unjust legislation regarding the operation of automobiles in the city of Cleveland, the Cleveland Automobile Club drafted an ordinance which was finally adopted with a few amendments. This ordinance, after having been in operation for some time, was amended, making the penalty $100 instead of $50. Further amendment gave more specific location to the registration numbers. A few arrests have been made for exceeding the speed limit and for not having numbers properly displayed, but on the whole the automobile public is running well within the terms of the ordinance. Much satisfaction is expressed, and the members of the club pride themselves upon having as just a set of automobile regulations as any city in the country, and are doing what they can to enforce the existing regulations.

ALLIANCE—General ordinance limits to 9 miles; strong anti-automobile feeling.

WARREN—Ordinance limiting speed in business section to 7 miles; outside, 10 miles; at street intersections, 6 miles; must carry lamp and bell or horn; may not drive abreast.

Penalty, not exceeding $50.

MARTIN'S FERRY — Ordinance limiting speed to 10 miles.

Must show lighted lamp after dark.

Penalty, not exceeding $20 and costs.

GALLIPOLIS—Ordinance of August 15, 1902, limits speed to 15 miles, and, at street corners, to 8 miles; must light lamps after dark, and ring gong at street crossings.

Penalty, $1 to $10.

COLUMBUS—Ordinance limits speed on business streets to 7 miles an hour and on other streets to 12 miles; requires bell or horn to be sounded when necessary, and lamps lighted after dark. Penalties, $5 to $50 fine or thirty days' imprisonment.

CINCINNATI—Speed is limited to 8 miles an hour. Horns or gongs must be sounded 100 feet ahead of street intersections. Lamps lighted from sunset to sunrise. Brakes must be efficient. Two automobiles are not allowed to travel abreast.

NEWARK—General ordinance prohibits speed of vehicles or animals of over 8 miles an hour. No arrests have ever been made. About twenty automobiles in use.

ILLINOIS.

CHICAGO—An ordinance provides that drivers must be examined and licensed by a board of examiners of operators of automobiles. License expires one year from date of issue. License fee, $3; renewal fee, $1. License may be revoked, after a hearing, if holder violates the regulations or is proved unfit. Speed is limited to 8 miles an hour. A bell or gong not less than 4 inches in diameter must be carried. One or more brakes must be provided sufficiently powerful to bring the vehicle to a stop within 10 feet when traveling at 8 miles an hour. Fine for driving without license, $5 to $25.

SPRINGFIELD—Ordinance limits speed to 12 miles per hour in the city.

PEORIA—A resolution was passed requiring the police to stop fast driving; the Park Board has prohibited the use of automobiles in the respective parks; some feeling against fast driving.

PRINCETON—An ordinance in contemplation.

ELGIN—A year ago an ordinance was introduced, but was referred to a committee and never reported upon.

CHAMPAIGN—Ordinance requires a 4 inch signal bell, brake strong enough to stop vehicle in 20 feet when going 10 miles an hour, and a lighted lamp at night. Speed is limited to 10 miles per hour and to 6 miles at street intersections. Penalties, $5 to $25 fine.

ROCKFORD—Ordinance in contemplation.

BLOOMINGTON—Just passed an ordinance.

BELLEVILLE—Ordinance requires a bell and the ringing of same 15 feet ahead of each street intersection, and a lamp lighted at night. Speed limit, 10 miles an hour; fine, $3 to $50.

OAK PARK—An ordinance is in force similar to that of Chicago. Authorities favor policy of reciprocity with other municipalities as regards licenses. There have been only few arrests and there is no antagonism to automobiles that keep within the speed limits.

EVANSTON—Ordinance requires that automobiles be equipped with a 4 inch bell and that same be sounded at street crossings, with a brake which will stop vehicle in 20 feet if running at 8 miles per hour and with a lamp or lamps. Speed limit, 8 miles per hour. Fines, $5 to $25. Very few arrests and convictions have been made under this ordinance; automobiles are much in favor, but it is felt that they must be properly regulated.

WAUKEGAN—Ordinance provides that operators be licensed, the city clerk issuing licenses; license fee, $2. All licenses expire on April 30 after date of issue. A

numbered badge is furnished with the license and must be worn by the operator at some conspicuous place on the outside of his garment. Speed is limited to 6 miles an hour in the business district and 10 miles an hour elsewhere. When meeting any vehicle, 100 feet from said vehicle speed must be slackened to 4 miles an hour. A 4 inch alarm bell is required, a brake stopping vehicle in 15 feet at 12 miles an hour, and a lighted lamp at night. Fines, $5 to $25 for first offense and $25 to $100 for subsequent offenses. No arrests have been made, but there is quite a strong anti-automobile feeling prevalent (the city is on the main road from Chicago to Milwaukee).

Lake County.

The board of supervisors have adopted a resolution that the State Senator and Members of the Legislature of that Senatorial district be directed to secure, if possible, a State law regulating the speed of automobiles.

BELVIDERE—Ordinance limits speed to 10 miles an hour.

RHODE ISLAND.

Amendment to general laws of the State provides that any person driving faster than a common traveling pace in any of the streets of Newport or Providence or in the compact part of any town or village or in any road leading from Pawtucket to the compact part of Providence shall be fined from $5 to $20 or imprisoned for ten days.

For racing an automobile with a horse, vehicle, automobile or other carriage, fine of $10 or imprisonment for ten days.

NEWPORT.—Ordinance limiting speed in compact part of city to 6 miles, outside 10 miles. Penalty, not exceeding $20 fine or imprisonment for ten days or both.

PROVIDENCE.—Bill now pending before General Assembly to regulate use of automobiles.

WAKEFIELD—Lies between Narragansett Pier and Matunuck, and upon complaint of residents about speeding has just adopted ordinance limiting speed to 6 miles an hour in the "compact" part and to 10 miles an hour in other parts; fine, $5 to $20.

At one time last summer three special officers were appointed to stop speeding, but they found the law was not stringent enough and no arrests were made.

CALIFORNIA.

SAN FRANCISCO—Ordinance limits speed within the fire limits of city to 8 miles an hour, and to 12 miles an hour outside fire limits. Violations are a misdemeanor and punishable with a fine not to exceed $500 or by imprisonment not to exceed six months, or by both. Another ordinance recently passed provides that gasoline for automobiles must be stored in tanks at least 4 feet below the ground outside the walls of buildings if in excess of 5 gallons. Permits must be obtained from the fire marshal. Penalties, same as above.

An ordinance has just been introduced in the City Council to license public automobiles, the annual fee to be $10 for vehicles carrying more than four passengers, and $5 for vehicles carrying four passengers or less.

OAKLAND—Ordinance requires good and sufficient brakes, bell or horn and a lamp at each side of vehicle. The speed limit is 8 miles an hour and the fine not exceeding $50.

PASADENA—Speed limits of ordinance, 8 miles; 6 miles in certain parts of city and 4 miles at intersections of streets. Bells are required. Fine, not exceeding $300 or three months' imprisonment.

LOS ANGELES—Chamber of Commerce has petitioned City Council to limit the speed of automobiles to 4 miles an hour at certain street crossings.

STOCKTON—Draft of a speed ordinance is in hand and authorities are studying the question.

NAPA—Public automobiles are licensed at $10 a year.

SAN RAFAEL—Speed is limited to 10 miles per hour; must stop when within 300 feet of a team; a license clause of the ordinance is void. Considerable opposition to automobiles here.

Except in a few districts, particularly in the vicinity of San Francisco, the feeling of the public is very favorable to the automobile. The roads are good, the machines in use are rapidly gaining in number, and California expects to profit more than any other State from automobile touring.

MICHIGAN.

ANN ARBOR—A resolution concerning automobile ordinance now before council.

JACKSON—General vehicle ordinance limits speed on business streets to 6 miles.

SAGINAW—Ordinance under consideration.

DETROIT—Ordinance in force regulating speed only—6 to 12 miles; legislation covering whole matter now before council committee; there have been many arrests.

BAY CITY—Pending ordinance limits speed to 8 miles in business portion; 10 miles in other portions; must carry and use alarm device and lamp; penalty, $5 to $100, or imprisonment from five to ninety days, or both.

ADRIAN—Ordinance limits speed to 6 miles in business district; 10 miles outside; penalty, $1 to $10, or imprisonment not exceeding ten days.

GRAND RAPIDS—Automobile operators must procure license, fee $1, which may be revoked by the mayor; limit in business section, 7 miles; other portions, 15 miles; must use alarm bell not less than 4 inches or more than 6 inches diameter, or similar alarm device; must provide brakes and lamps; penalty, fine not exceeding $25; or, in default, jail not exceeding thirty days; one arrest has so far been made.

LANSING. — Ordinance has
passed limiting speed to 10 mile
and 12 miles on unpaved streets;
required.

WISCONSIN.

OCONOMOWOC—Now considerin
bility of ordinance.

JANESVILLE—Ordinance limitin
10 miles.

Bell and lamp required; pena
$10.

MILWAUKEE—Pending ordinan
speed to 8 miles, and at street c
intersections, 4 miles.

Brakes must stop vehicle with
at 8 mile speed.

Must carry alarm bell or g
lamps.

Penalty, $1 to $50, or jail for
than ninety days, or both.

Ordinance limits speed to 8 m

MISSOURI.

ST. LOUIS—Ordinance limits s
miles an hour in streets and 6
hour in parks. Fine, $5 to $50
has been some reckless driving
and consequent accidents and ar
the press has assumed a hostil
toward high speed.

KANSAS CITY—An ordinance
before the Common Council
that the speed must not exceed
an hour in the business distri
miles an hour in other parts of
A lamp must be carried on each
hicles must be registered and be
with a plate bearing the registra
ber in figures 4 inches high.
must procure a license; license fe
newal fee, $1. Licenses are issu
board of engineers. Penalties, $
fine.

JOPLIN—Speed is limited to 6
hour; vehicles must carry a g
lighted lamps at night.

SEDALIA—Speed limit, 6 miles
two lamps are required.

INDIANA.

The general feeling is very
toward the automobile. No State
very few ordinances.

INDIANAPOLIS—License ordin
just been introduced.

LAFAYETTE—Ordinance limits
10 miles an hour and requires g
lamp. Fine, $5 to $25 and costs

KOKOMO—An ordinance limits
10 miles an hour within a certai
of the city; it is, however, ne
served nor enforced.

EVANSVILLE—Speed is limited t
an hour; fine, $1 to $50.

CONNERSVILLE—Ordinance limits
8 miles an hour.

SOUTH BEND—Ordinance pendi
ing license; license fee, $4.

MARYLAND.

BALTIMORE—The regular traffic law, which limits speed to 6 miles an hour and imposes a fine of $5 on violations, is applied to automobiles. The latter are few and there have been no arrests so far. There are no special laws in force in any part of the State.

FLORIDA.

There are no special automobile regulations in any part of the State.

GEORGIA.

SAVANNAH—City ordinance limits speed to 8 miles an hour; fine, not to exceed $100 and imprisonment not to exceed thirty days.

OAKLAND CITY—Speed limit, 8 miles; fine, not to exceed $100 and costs.

No regulations in Atlanta, Thomasville, Augusta, Rome, Brunswick or Columbus. In Macon the speed is limited to 8 miles an hour.

MAINE.

PORTLAND—General law limits speed to 8 miles.

BAR HARBOR—Ordinance limits speed to 7 miles, and prohibits use of two principal drives; law not tested.

NEW HAMPSHIRE.

FRANKLIN—Automobile drivers must slow up or stop for frightened horses, as necessary; penalty, $10.

VERMONT.

In all this State, only the town of Manchester, Bennington County, which limits speed to 8 miles, appears to have any law on the subject.

Several places report strong anti-automobile feeling, namely: White River Junction and Springfield, Windsor County; Winooski, Chittenden County; Derby, Orleans County, and Manchester, Bennington County.

VIRGINIA.

No special legislation reported in any part of this State.

WEST VIRGINIA.

PARKERSBURG—Ordinance limits speed to 8 miles.

WHEELING—Ordinance limits speed to 5 miles; penalty, $5 and costs.

TENNESSEE.

No special legislation reported in any part of this State.

MINNESOTA.

FERGUS FALLS—Reports only one automobile in the county; seven runaways in one day, but taken as matter of course, all recognizing the automobile as the coming vehicle.

MINNEAPOLIS—No special ordinance at present, but one contemplated; several arrests and fines under general vehicle law limiting speed to 7 miles; local club favors law similar to that of Cleveland.

ST. PAUL—Ordinance of August 22, 1902, limits speed to 10 miles.

Lamps required; penalty, $10 to $100; or imprisonment for ten to eighty days.

WINONA—Ordinance of July 11, 1902, limits speed to 8 miles—6 miles over bridges.

IOWA.

DAVENPORT—An ordinance has been introduced in the City Council limiting speed to 8 miles an hour and requiring vehicle to be stopped at once whenever a horse shies. A bell and a lamp are required. No other regulations are reported from this State.

SOUTH CAROLINA.

No regulation of automobiles are in effect in any part of this State as far as our reports go.

NORTH CAROLINA.

NEWBERN—City license required; annual license fee, $50. No other legislation reported from this State.

NORTH DAKOTA.

No automobile legislation in any part of the State reported.

KANSAS.

WICHITA.—An ordinance has been drawn up limiting speed to 8 miles an hour in the business district, 6 miles in the parks and 12 miles in other parts of the city. The vehicles must have a bell or horn and a muffler to deaden the noise of exhaust. Fine, $10 for first and $20 for succeeding offenses.

LEAVENWORTH.—Some irritation has been caused by reckless driving, and regulations may be adopted if the automobilists take too many liberties.

NEBRASKA.

OMAHA.—No automobile ordinance; automobiles are given the same privileges as horse vehicles, and are limited to 10 miles an hour. There are a few places in the city parks where signs are posted prohibiting automobiles from driving therein, on account of sharp turns or high embankments.

LINCOLN.—Ordinance limits speed to 8 miles an hour; another ordinance imposes a license duty of $25 per year on automobiles for public passenger service.

LOUISIANA.

NEW ORLEANS—No anti-automobile feeling; ordinance regulating speed was introduced but never passed.

BATON ROUGE—Ordinance limits speed to 8 miles per hour in the towns and 5 miles at corners.

SHREVEPORT—Must carry two lights and speed limited to 8 miles an hour.

COLORADO.

DENVER.—Colorado Automobile Club's ordinance proposed limiting speed to 15 miles and to 8 miles within congested district.

Failed to pass.

The present city vehicle ordinance limits speed to 8 miles and at street crossings to 4 miles.

IDAHO.

No State, county or city laws on the subject.

KENTUCKY.

No special legislation in any part of the State.

NEW MEXICO.

No special legislation reported. "The fad has not traveled this far yet."

OREGON.

PORTLAND—A speed and licensing ordinance is now pending. No other automobile legislation is reported from this State.

WASHINGTON.

SPOKANE.—Speed limit 8 miles within fire limits and 12 miles outside in city confines.

UTAH.

No special legislation reported in any part of this State.

WYOMING.

No special legislation reported in any part of this State.

MONTANA.

This State reports no special legislation.

CANADA.

Province of Ontario.

HAMILTON—Bylaw limiting speed to 12 miles on all roads in Wentworth County.

TORONTO—Proposed to introduce bylaw regulating speed.

LONDON—Regular bylaws impose penalty for immoderate speed.

SOME LEADING AUTOMOBILE SUITS.

The Cross Case.

November, 1899—October 31, 1900.—Damage suits for $3,000 and $5,000 were brought against Alonzo T. Cross, of Providence, R. I., by Walter S. and Ella A. Williams, for frightening horse with automobile, overturning carriage and injuring plaintiffs.

The Common Pleas Division of the Supreme Court of Rhode Island gave a verdict of $1,400 for Mr. Williams and $200 for his wife.

The Higdon Case.

December, 1899.—Three damage suits were brought against John C. Higdon in the Circuit Court at Clayton, Mo., by Mrs. Katharine Onslen and daughter; alleged that defendant's automobile was beyond control, frightened horse and overturned buggy, throwing out plaintiffs, one of whom died. Dismissed, defendant paying costs.

The West Case.

April, 1900.—Jonathan West, of Rochester, N. Y., sued for frightening a horse owned by Mason Brothers with his steam carriage, and judgment being secured against him, appealed before County Judge Sutherland, who reversed the judgment on the ground that the temporary inconvenience incident to these modern and practical modes of travel must be subordinate to the larger and permanent benefits resulting from the adopting of such improvements.

On May 8, 1901, an appeal was taken to the Appellate Division, and Judge Sutherland's decision reversed, the court holding defendant negligent in having operated a machine that emitted so much steam.

On June 19, 1901, Mr. West having died, the Automobile Club of America appealed the case for his widow, but the Appellate Division refused the appeal and the verdict stands.

The Vroom Case,

Dr. William L. Vroom, of Ridgewood, N. J., was sued by John L. Guyre, of Woolwick. Alleged that Vroom's automobile frightened Guyre's horse, causing it to run away, throwing out Guyre's wife, who was killed. Vroom testified that horse was frightened when 275 feet distant, and that he stopped his automobile. Judge charged finding whether automobile was a nuisance. Jury agreed it was not a nuisance.

Nominal Damages.

September, 1900.—Wilson R. Smith, of New York, was sued by Daniel Platt, of Patchogue, L. I., because Platt's horse became unmanageable at sight of Smith's automobile, throwing out Platt and wife, the latter being hurt severely; $170 damages were claimed. The court awarded $120.

A Bay State Verdict.

January, 1901.—L. C. Havener and Mr. Lewis, of Worcester, Mass., were sued for $2,000 damages on allegation that their motor cycle had caused runaway. Henry A. Corey, of Shrewsbury, Mass., the plaintiff, was awarded a verdict of $1,400.

The Knight Case.

April, 1901.—Charles W. Knight vs. James F. D. Lanier. A suit for damages caused by defendant's automobile frightening plaintiff's horse.

Judge William J. Gaynor, of the Supreme Court of Nassau County (Brooklyn), N. Y., instructed the jury that the automobile has as much right to the street as the horse, but that if the defendant started up his automobile, the horse, being evidently in distress, without being beckoned by the plaintiff to go on, that was negligence, for which he was responsible. The jury awarded nominal damages.

The case was appealed on May 28, 1902, and judgment reaffirmed.

The Royal Case.

May, 1901.—Dr. T. Cook Royal, of Ballston Spa, N. Y., obtained judgment of $308.25 from Louis W. Moore for damage caused by Moore's automobile frightening Royal's horse. Defendant disputed legality of decision and entered appeal on the grounds that: (1) no negligence was shown on his part; (2) the plaintiff was not free from negligence; (3) the statute (highway law of 1890, Section 155) does not apply to automobiles.

The appeal was denied, the Appellate Division confirming decision of Judge Russell that a steam automobile must be preceded one-eighth of a mile by a man warning of its approach.

A Test Case.

August, 1901.—A test case brought by Southampton (L. I.) village authorities to fine Sidney Allen for "running his automobile on the public highways at an unreasonable and unsafe speed" was dismissed by Justice Edward H. Foster on the ground of a defect in the papers.

The Blum Case.

September, 1902.—Blum Brothers, found guilty of negligence in operating automobile resulting fatally to Richard Henches and injuring John Krieger, settled by paying $2,000 to the heirs of Henches and $2,000 to Krieger. October 8 Henry L. Blum and his chauffeur were indicted for maintaining a nuisance by Bergen County (N. J.) jury and fined $500 each.

The Dietz Case.

September, 1902.—August Dietz, chauffeur of W. D. Guthrie, of Lattingtown, Long Island, was fined $20 for violating Cocks law. Guthrie gave notice of appeal. Dietz was discharged by Justice Wallace because timing device which led to arrest was inaccurate.

A Kansas Case.

August, 1902.—F. D. Shellbarger, of Saline, Kan., sued in the District Court there by Jacob Gottschall and wife for $8,136.50 damages for injuries received in a runaway caused by Shellbarger's automobile.

The Mulliken Cases.

July, 1902.—Edward A. Mulliken, of Quincy, Mass., charged with manslaughter and violation of automobile law by State Officer Thomas A. Dexter, claimed that Ariel B. Scott's horse became frightened, throwing Mr. Scott, who received fatal injuries.

August, 1902.—Scott's widow brought suit for $10,000.

The finding of Judge Eldridge, of Duke County, was that Mulliken did not exercise reasonable care in operating his automobile.

The Wallace Case.

July, 1902.—E. C. Wallace, of New York, was fined $25 by Justice Fisher, at Nyack, N. Y., for running at illegal speed.

Suit for $25,000 damages was also brought by E. T. Lovatt, who, with his wife, was thrown from horse vehicle.

July, 1902.—Supreme Court Justice Cochrane, of Brooklyn, granted order carrying Justice Fisher's judgment to the County Court of Rockland County.

The Whipple Case.

May, 1902.—The case of Harlan W. Whipple, charged with causing a runaway near Herkimer, N. Y., by excessive speeding of his automobile, was dismissed.

The Woodworth Case.

May, 1902.—First test case under Cocks anti-speed law. Harry S. Woodworth, of Rochester, N. Y., charged by C. B. Parsons, a Brighton mail carrier, with driving his Panhard at greater speed than 20 miles an hour, frightening Parsons' horse, causing it to run away and scatter the mail. Fined $50. Appealed. Judgment sustained. Case now carried to higher court.

Violated "Initials" Provision.

March, 1902.—Charles W. Hall, of 140 Nassau street, New York, arraigned for failing to carry number or initials on his automobile, under Section 531 of 1901 law. The magistrate was not conversant with the law and paroled Mr. Hall pending inquiry, which never took place.

Smith versus Wittmer.

FEBRUARY, 1902.—Thomas Wittmer, of Pittsburg, Pa., was sued by C. C. Smith for $5,000 damages sustained by negligence on Wittmer's part in driving his automobile, causing Smith's horse to run away, and throwing Smith and a companion into a creek 30 feet below.

The Goff Decision.

MAY, 1902.—In the Court of General Sessions, New York city, Recorder Goff decided that city magistrates had no power to fine speed offenders, the offense coming under the jurisdiction of the Court of Special Sessions. This was in the case of August Paterson, charged with running his vehicle at 12 miles an hour. He was fined $50 in the Harlem Police Court, but Recorder Goff decided as above on appeal.

The C. H. Mackay Case.

FEBRUARY, 1902.—C. H. Mackay, of Mineola, Long Island, whose automobile had scared a team of horses belonging to Samuel Goldberg, causing them to run away, was sued for $368. The Mineola jury awarded the plaintiff $280.

The Raymond Case.

OCTOBER.—Judge Kellogg, at Yonkers, sentenced to six months' imprisonment W. B. Raymond, an automobile driver, whom he found guilty of negligent driving, resulting in a collision with a street car, the car upsetting and injuring twenty-two passengers. The automobile ran ahead of the car on the track and the car collided with it and was thrown from the track.

The case attracted wide attention in automobile circles. The testimony, it is claimed, failed to show any greater negligence on the part of Raymond than on the part of the motorman, who, it is alleged, was racing his car at the time as is customary in this section of Yonkers. Damage suits aggregating a large amount have been brought by persons injured against the railroad company, and the automobile associations are investigating with the object of having the sentence revoked if the circumstances justify it.

The Warburg Case.

OCTOBER, 1902.—F. A. Warburg, of New York, was sued at Trenton, N. J., for $50,000 by J. B. Hughes, of New York, for having caused a team of horses driven by the latter to run away, resulting in the loss of one horse and personal injury to the complainant. Damages were awarded plaintiff to the amount of $12,070.

This case establishes a precedent for damages done in horse runaways caused by shying at automobiles, and the case is being appealed. If necessary the American Automobile Association will fight the case for Mr. Warburg.

Judge Kirkpatrick in the suit held that: "It is not negligence per se to operate an automobile on the public highway. By that I mean that the mere operation of an automobile upon the highways does not of itself constitute negligence, such negligence as the owner of the automobile would be answerable for in law for damages sustained by reason of its being on the highway.

"The highway is for the common use of everyone who has occasion to travel over it, whether it be in a carriage drawn by horses or in an automobile propelled by electricity, so to speak. But each one must use this common right with due regard to the rights of others. The use of the streets and of the highways is subordinated to a duty to exercise care that others who have equal rights may not receive an injury. One may not wantonly commit any act upon the highway which is likely to result in injury to others."

The severity of the sentence has attracted the attention of the Automobile Club of America and the American Automobile Association, and an investigation is being made. The damage suit came to naught when Marble took the poor debtor's oath.

The Beach Case.

OCTOBER, 1898.—An accident was caused in a suburb of Bridgeport, Conn., by a horse driven by Dr. Collard taking fright at an automobile driven by F. C. Beach, of New York. The automobile (an electric carriage) was behind and to one side of the carriage. The doctor had just stepped out of the carriage and had the reins wrapped around one hand. The horse took fright, ran and pulled him over and he was dragged 50 feet. It was alleged that the peculiar appearance of the machine was calculated to frighten horses of ordinary gentleness.

Plaintiff served papers on Mr. Beach in New York, and the case came to trial in October, 1901, before Judge McLean. The verdict was unanimous in favor of defendant. The judge reopened the case on the ground that he had omitted in his charge to the jury a citation which might have influenced the verdict. The case was again argued by counsel before the judge, and the latter decided on a new trial. Defendant took an appeal from the judge's decision to the Appellate Division, which will be argued the present fall.

A Six Months' Sentence.

Herbert A. Marble, driver for a New York automobile storage company, who, while in New Haven for the purpose of bringing an automobile to New York, took a spin out North Haven way, collided with a horse and buggy and killed Christian Molz and injured his son, was convicted of manslaughter at Wallingford and sentenced to six months in the penitentiary.

Indiana Supreme Court and the Rights of the Automobile.

DECEMBER, 1901.—The Supreme Court of Indiana held that automobiles have equal rights on the road, and the mere fact of a horse taking fright is not sufficient ground for suit.

A Runaway Case.

JANUARY, 1902.—Max Altman, of Tonawanda, N. Y., brought suit against the Mobile Company of America because his horse was frightened by a mobile and ran away, wrecking the carriage and injuring itself. Altman claimed $200 and was awarded $170 and costs, $11.95. The Mobile Company filed notice of appeal.

The Staten Island Tragedy.

JUNE, 1902.—The grand jury of Richmond decided not to indict W. C. Baker and O. E. Denzer, the operators of the electric car that ran amuck at the Staten Island races, killing three persons.

A San Francisco Suit.

JULY, 1902.—First automobile damage suit in San Francisco. E. Courtney Ford sued for $5,000 damages by a salesman for a tailoring firm, who was run over and sustained injuries by Ford's automobile.

Prosecution Failed.

SEPTEMBER, 1902.—At Southampton, N. Y., the case against Gerald May for alleged violation of Cocks law was dismissed, because the State failed to show the village was incorporated.

A Self Appointed Constabulary.

In Lincoln, Mass., some private parties, it seems, have taken it upon themselves to enforce a local ordinance against automobiles. With stop watches, horns and a rope across the road they, on Sunday, November 2, held up a number of automobilists, including one motor cyclist, informing them that they violated a town ordinance which limited the speed of automobiles to 8 miles an hour. The motor cyclist sustained a fall and received some severe injuries.

It may be of interest to these parties to know that a similar timing device recently used on Long Island was declared by the judge before whom the case came up to be unreliable. Their right to stretch a rope across the road is extremely doubtful, and if this should result in personal injury, as in the case of the motor cyclist, they may render themselves liable to action for assault and battery.

...COMMUNICATIONS...

A California Trip.

Editor HORSELESS AGE:

Accompanied by R. B. Hain, superintendent of the Auto Vehicle Company, of Los Angeles, I had the pleasure of testing the first vehicle turned out by the only automobile factory on the Pacific Coast—a 6 horse power gasoline vehicle built for two passengers, but specially fitted with tonneau for carrying two extra passengers, which on our trip proved a handy place for luggage, overcoats, a small rifle and a satchel well filled with repair outfit and parts we fancied might be of use in case of breakdown. Yet we opened the case but twice on the entire journey and could have carried all repair parts needed in my vest pocket. Our destination—San Diego—over the route we traveled is 177 miles to the south of Los Angeles. The trip led through a land actually flowing with milk and honey, through vast ranches golden with grain, rich with fruits and vineyards, a land of sunshine and prosperity. The mountains and foothills are teeming with a hidden wealth of gold, silver, copper and iron, and every valley is fed by streams from mountain springs—both hot and cold—many of them of great medicinal value. Thousands of cattle, horses, sheep and goats graze on the vast table lands skirted with green alfalfa fields. All this and more—for quail and small game abound. The people are hospitable, the mountain scenery is grand and the air and water are as pure as anywhere on earth. It was a trip full of delights with no one thing to mar its memory—an auto trip that, we believe, will be taken in the future by hundreds of tourists, and a route as far as Pomona over which, before long, some enterprising company will establish a regular auto service.

Leaving Los Angeles on September 21, via Garavanza and the Arroyo, we made Pasadena, 9 miles, in forty minutes, and left there at 9:30 a. m. We went out East Colorado street, through Lamanda Park, Lucky Baldwin Ranch, passed Monrovia (10 miles) and followed the telegraph poles to Azuza (27 miles), where we arrived at 10:25. There we oiled the machinery, and, leaving at 10:40, over freshly oiled roads, we soon whirled past Duarte and Azuza. Here we went out of our way a mile, to Glendora, but turned back that we might try a fine oiled road 2 miles south, through San Dimas wash to Lordsburg and North Pomona. Here we turned directly south over fine clay roads to Pomona (39 miles), arriving at 11:55. There we had dinner, oiled up and took on 1½ gallons of gasoline, which delayed us fifty minutes. We left Pomona via Garey avenue and took the road along the foothills of the Santa Ana Mountains, to the west of Chino, with its vast beet lands and alfalfa fields. This road at this time of the year is dusty and badly cut up in places, but if properly worked and oiled would make a splendid highway, beautifully lined with Japanese sunflowers for miles. At 2:15 p. m. we passed Rincon, crossing the railroad track and over the Santa Ana River bridge, a fine camping ground. From Rincon the grade is more noticeable, the clay road, in fine condition, being freshly oiled for 2 miles; then follows 4 miles of good oiled road to Corona. After twenty minutes here, examining and oiling machinery, we left at 3:05, following telephone poles. Winding through the Temescal wash, the Sierra, Sugar Leaf and Santiago peaks of the Santa Ana Mountains to the west and San Jacinto on the east, we passed Glen Ivy Springs, then Temescal. Thus far on the trip we had used the low gear only eight times and never over ten minutes at a time. We had made good time, though not seeking to make a record trip. Teams en route and a drove of goats at Rincon had delayed us fifty-seven minutes.

On Monday morning, finding that we had room for nearly 3 gallons of gasoline, we filled the tank, oiled the machine, and at 7:03 proceeded to follow the telegraph poles (now our only guide to San Diego) to the old Indian town of Temecula, 6 miles, passing at 7:32. Crossing the Temecula Valley the road is sandy until after fording the Penjango Creek. At the Indian reservation the ascent of the Pala Mountain commences, as well as the first genuine test of the rig, for there is 6 miles of tortuous road, just wide enough for a single rig and very few places for teams to pass. Meeting three hay teams caused a delay of forty-five minutes. The six horse teams were evidently not familiar with "horseless" wagons, and seemingly cared little whether they dropped off a thousand feet or more into the canyon or not. The descent from the summit was made with the emergency brake in use, and when we reached the long stretch of dry sand road at the foot of the grade it was with a sense of relief that the first mountain had been passed without mishap to others or ourselves. At Pala we took snapshots of the old mission, added a bucket of water to the cooling tube supply, oiled and left, after a half hour stop, at 10:05. The Pala storekeeper warned us of a deep sand road a mile long, then a mountain climb just twice as bad as the Pala grade, that we were "foolish to attempt, etc." The engine seemed to take in the situation, and we worried through the Pala River bottom at low speed, continued on up the mountain, with one slight down grade turn. At the "Escondido, 16 miles" sign we started up a 20 to 30 per cent.

THROUGH THE FIRST RIVER BED.

HEAVY GRADE AND POOR ROAD.

Top of the Long Grade—3,600 Feet in Six Miles.

In the Ocean Sand, Where We Both Got Out and Pushed!

grade without respite for miles, until we reached Valley Centre at 12:18. There we oiled the rig and added to the water supply, which was steaming. Escondido and dinner were 9 miles distant, with another mountain climb of over 2,000 feet over a very narrow, rough road, on which we were destined to be delayed by a number of teams on the down grade. A nearly level run of 4 miles on the "Rincon del Diablos" dusty roads brought us to Escondido at 1:50. We spent an hour for dinner and to oil the gears and put in 2 gallons of gasoline, when we were in fine shape for the rest of our day's journey.

A STRAW ROAD.

What would have been a poor road for the first 3 miles out of Escondido was made a first class highway by the use of a liberal amount of straw over the loose sand. It was our first experience on a straw road, and many times after we wished for straw. Straw roads are just perfection for automobiling. It was 40 miles to San Diego via Bernardo, Poway, Nerton and Virginia. The long winding grade of the Poway Valley Mountain was found to be well worked and the roadbed in splendid condition, making the ascent seem easy after climbing the rough roads. From the crest of the Poway we enjoyed the down grade and miles of level tableland, from which we dropped to the bed of the San Diego River. Crossing this river the writer walked beside the rig to lighten the weight, while Mr. Hain put on the low gear and actually ployed through sand up to the hubs. This was one of the stretches of sand road where we wished for straw and plenty of it. After crossing the river we turned at the county hospital, and, climbing the long hill, reached the top of the grade and the residence portion of the city, at 6:15. Ten minutes later we ran the rig into the storage barn near our hotel and telegraphed the Auto Vehicle Company.

C. S. Hartman.

"Robin Damon's Troubles"—A Chain Repair.

Editor Horseless Age:

"Robin Damon's Troubles" are, as always, most entertaining reading, but why does he elect to rivet up a broken chain under his car? Others do such riveting in the most convenient place at hand, and afterward put chain in place on sprockets, and join ends by the coupling link. It is fashionable at present to condemn the steam car, and I have been so far influenced by this general trend that I have spent much time trying to find a gasoline rig which I could feel was a satisfactory substitute for my present steamer, but have so far completely failed. The letter of Thomas Kittredge in last issue shows that I am not the only one who has found steam preferable. One of its advantages is immunity from chain troubles, as shown by these two communications already referred to. The hydrocarbon motor is necessarily harder on the chain than is a steam engine, and, as shown by Mr. K., even when so worn as to jump the sprocket, the chain does not break, but is easily run on again. For myself I am but a novice in auto experience compared to Mr. Damon, having a record of only a little over 7,000 miles to date; but in that distance I have never broken one chain, and the only road trouble with one was within three days of arrival of my first car. The coupling link was held together by a piece of fine wire, which I suppose worked out. At any rate, the chain ran off, and I failed to find any portion of that coupling link. As the chain was of the "detachable link" variety, with mechanically fastened instead of riveted pins, and several spare links had been sent with the car, I just slacked the chain adjustment as far as possible, threaded the chain over front sprocket, and around rear axle to one side of large sprocket, coupled the ends with one of the spare links, and then worked chain onto sprocket like working a belt onto a pulley, and tightened chain adjuster, and except for a little further tightening from time to time, and occasional cleaning and greasing, I gave that chain no further thought or attention up to time I sold the car, one year later. Having in the past five months run a steam car with condenser some 3,200 miles, much of it over the rough and hilly roads of Western Pennsylvania, and often accompanied on these trips by a friend who owns four gasoline rigs of aggregate cost nearly six times that of my one steamer, who yet prefers to ride with me rather than to chance the troubles of the other type of car on such runs, I have pretty well concluded that steam, with a condenser, is, as this friend has put it, "hard to equal and impossible to surpass!"

R. W. B.

The Power Lost in Muffler—The Oldsmobiles in the Reliability Contest.

Editor Horseless Age:

L. T. Brown inquires how much more power an Oldsmobile engine should develop with a valve between the compression chamber and the muffler. I know that if you can stand the noise a valve will give some more power, as I had a butterfly valve put on my machine; but the trouble is farther back—the valve opening itself is too small. The engine does not develop near the power that it should or that it could with that size cylinder, but I found I could do nothing with it without having a new cylinder made. How this machine made the record that it did in the Reliability Run I do not understand. They certainly could not have used the regular stock machine like mine.

G. E. M.

[We submitted this letter to the Olds Motor Works for reply and received from them the following.—Ed.]

The machines used in the Reliability Run

from New York to Boston and return were the regular stock machines. They were fitted with our new style mixer. This, however, does not add to the power, but makes the machine a little more reliable, as the new mixer is far simpler than the old device.

We do not know where to address L. T. Brown or we would write him direct. The cutting out of the muffler will not add over 5 to 10 per cent. to the power. Our present machines have a little greater valve lift and develop on the brake about 5 horse power, which we rate at 4 horse power. There is no trouble about any of our machines doing the same work that was done in the Reliability Run if they are put in proper order. The great trouble is that repair men throughout the country do not understand them as well as they might. We expect to do something along this line in the near future to educate them more thoroughly as to the requirements of a gasoline motor. OLDS MOTOR WORKS.

A Subject for Legislation—Observers.

Editor HORSELESS AGE:

The suggestions made by St. Russ in the letter published in your last issue, that I imagine that our laws are enforced and that it is the lack of laws which causes drivers to ignore the plainest rights of others, are entirely without foundation.

Discussions concerning the enforcement of general laws do not seem to me, however, to come properly within the scope of a technical journal such as THE HORSELESS AGE. On the other hand, legislation upon a new subject matter ought properly to be preceded by discussion of moot points in technical jourhals dealing with the subject, and my suggestion was made with this view.

It still seems to be that, conceding that the present laws, if enforced, would cure many of the evils from which the public suffer, the public rights can be still further safeguarded by appropriate legislation. For example, in addition to the points given in my last letter, I think that all automobilists of experience will agree with me that throttle and reverse levers on steam machines, at least, should be so latched as to prevent their operating by accident. I think also many will agree with me that all automobiles should be so fitted that if the operator leaves the carriage with the power on it should be impossible for anyone else to put the carriage in motion.

Further, it should be made compulsory on all builders of automobiles to fit them with brakes sufficiently powerful to hold them either way upon shutting off the power upon the greatest incline which the maximum power which the machines are capable of delivering would enable them to ascend, and legislation on these points should be so framed as not only to impose penalties for violations, but also to give the persons injured by reason thereof a cause of action against the builder of the carriage, as well as against the user or owner thereof.

As the law stands at present, a bystander may be injured because of the faulty construction of a carriage in some one of these particulars, and find that any redress at law which he may have is against a wholly irresponsible person, and is therefore valueless to him.

The necessity for these requirements seems plain.

I have seen on one occasion a steam carriage left by the sidewalk set in motion by a mischievous boy, and on another occasion I have seen a carriage capsized on a steep hill because the power failed and the brakes were inadequate. In addition to the cases that have come under my own eye, I have known of many such cases, and so, I presume, have most of your readers who have had any considerable experience in automobiling.

I think that it is also desirable, for the sake of uniformity, that the question of brakes be further regulated by law, and that, after experts had decided whether a forward or backward action was preferable, all brakes should be required to be fitted in the prescribed direction only.

As a letter on automobile topics at this time would seem to be incomplete without some reference to the recent Reliability Contest, permit me to say that I am strongly in favor of your suggestion that the operators should change vehicles each day. It also seems to me improper that a contestant should know some days before the contest who his observer was to be, and doubly improper that the observer should be his friend or connected with him in business. It seems equally important that the observers should have considerable practical acquaintance with automobiles, that they should have some perseverance and grit, and that they should not be connected pecuniarily with the automobile business.

I am not aware whether Robin Damon and his passenger possess the last named qualification; if so, they and men of their stamp would be admirable observers.

May we all have such passengers when we meet with trouble in bad weather!

VIATOR.

The Kind of Information He Wants.

Editor HORSELESS AGE:

I herewith hand you New York draft for $1.50, for which please send THE HORSELESS AGE to my address for the next six months, beginning with your issue of this date.

I make this subscription after reading your reports of the Reliability Contest and the criticisms passed on them by some other publications.

I noted particularly that the truth of no statement was challenged.

If there were accidents, the public should know it and know the cause, that it may avoid repetitions; if there are defects or objection[illegible] es about any vehicle it is to [illegible] both the purchaser and the maker that it be pointed out that it may be remedied. In other words, it is the very information that many people are seeking and have no means of obtaining other than through trade journals.

I do not make this statement for publication, but that you may know how some of your readers view the matter.

I am not even a possessor of an automobile, but I may be some day, and if I should be I want to know what I am getting and have some intelligent idea of how to manage and care for it when I get it.

W. H. JULIAN.

Proportion of Power of Two and Four Cycle Engines.

Editor HORSELESS AGE:

Your answer on page 452 to an inquiry on "Proportion of Power of Two and Four Cycle Engines" cannot be passed without a protest. A properly designed and proportioned two cycle engine can be made to run just as fast as a four cycle engine of the same size, and keep up its power. For instance, I have run a 4x4 two cycle, two cylinder engine on the testing block, giving 4 horse power at 400 revolutions per minute, and 10 horse power at 1,000 revolutions per minute. This is nearly twice what the four cycle engine of the same dimensions will give at the same speed when using the same compression.

I would like to add that the position taken by various writers regarding two cycle engines for automobiles is entirely unwarranted. This is especially true as to the position usually taken with regard to the speed of two cycle engines. We have run one of our late machines for miles on the track on the intermediate speed, which allows the engine to run at 1,650 revolutions per minute. I might add in conclusion that the two cycle engine we use on our machines gives us far less trouble than a great many four cycle engines do other manufacturers.

I think the importance of the subject and the unfair position taken by the average writer on gas engines would warrant your giving this letter the prominence it deserves in fairness to everybody.

E. W. ROBERTS,
For Elmore Mfg. Co.

Difference in Power With and Without Muffler.

Editor HORSELESS AGE:

In answer to your question in your paper of October 22, I know of an Oldsmobile which had a valve for cutting out the muffler, and, as I used the machine in this way during the past summer, I found that when running along at high speed—about 20 miles per hour—if the muffler was opened it would increase the speed of the machine up to about 23 or 24 miles per hour; but it did not seem to have much effect on the power in hill climbing or running through very bad roads. G. O.

Responsibility in Case of Accidents.

Editor HORSELESS AGE:

I have lately been informed that some time last spring suit for damages was brought in a court in Connecticut by a doctor against the owner of an automobile for causing his horse to run away, etc., and that the case was dismissed on the ground that the judge contended that the automobile was in the line of progressiveness; that it had come to stay, and that no one had any right on the public highway with an animal that was afraid of it.

My object in writing to you is to find out if the above is true, and if so to get a copy of the decision.

I was out riding last April and met two horse vehicles, but pulled out to one side of the traveled road entirely and stopped my automobile when the nearest horse was about 200 feet away. My son (eighteen years) was with me, and we sat in the automobile and waited while the first horse came 10 within about 50 feet, when the horse stopped. The driver urged him, when he moved ahead rather nervously about 15 feet, then reared, broke the right trace, and turned around with his left shoulder upon the point of the left shaft, which penetrated the shoulder about 3 inches, cut an artery, and bled profusely. The second horse did not frighten at all. I ran into Doylestown, a mile away, and brought a veterinary surgeon, who stopped the flow of blood, and the horse was put in a stable and left there.

I paid the veterinary surgeon his charge ($1), and after taking him back went my way. I, however, asked him if the horse was injured seriously, to which he replied no; with two or three dressings it would come all right. In a few days I received a letter from the owner asking for assistance as he was poor, etc. I sent him a check for $10, at the same time telling him that had he been as careful as I was there would have been no trouble; and, while I was in no way to blame, I made this remittance so that I could not be considered mean.

Later I received a bill from the veterinary surgeon for $26.50, which I refused to pay; and now the owner of the horse has put it in the hands of an attorney for collection, and he sends a bill for the above plus $30 for loss of use of horse thirty days, and threatens suit. Judge Yerkes, of Doylestown, Bucks County, this State, where the accident occurred, has declared himself very antagonistic to automobiles, and says they are a nuisance upon the public highway, and their owners should be held responsible for any and all accidents that may occur to horses in consequence of their presence on the road.

THOMAS ROSE.

[If the facts are as you state them we cannot see how you can possibly be held liable. If there should be a judge who holds such extreme views as you mention, and he should decide against an automobilist in a suit arising from an accident caused by a horse shying at an automobile where the automobilist did all that was incumbent upon him, such decision would not be upheld by the higher courts. At any rate, the complaining parties would have to prove your legal responsibility for the accident before they can collect for the damages.

The information about the charge by a Connecticut judge has been sent you by mail.—ED.]

NEW VEHICLES AND PARTS.

The 1903 Model Stanley Steam Carriage.

The new model of the Stanley Brothers, of Newton, Mass., herewith illustrated, differs considerably from their 1902 model in general style and arrangement. The gear and body have been lengthened about 8 inches, and by this improvement the front seat has been made much more roomy and comfortable. As will be seen in the photo (in which the front seat is closed), the front design has been changed from the rather abrupt outline of last season to a long sweep, and the rear part of the body has been similarly altered, the sides flaring and the rear panel sloping outward toward the end of the carriage floor.

The new model has the Stanley horizontal engine with ball bearing crossheads. The engine is coupled direct to the rear axle differential by a spur gear, thus avoiding the use of a chain. The engine and gear are inclosed in a copper case, and these parts are practically dustproof and run in oil.

A water level indicator has been substituted for the gauge glass formerly used, to save trouble from broken glasses and to save the body from getting scratched and seared up. The upper opening in the smoke pipe has been disposed of and all the products of combustion are now discharged below the body. Thus the top of the body has a much neater appearance, the only opening now seen being the one through which the water tank is filled.

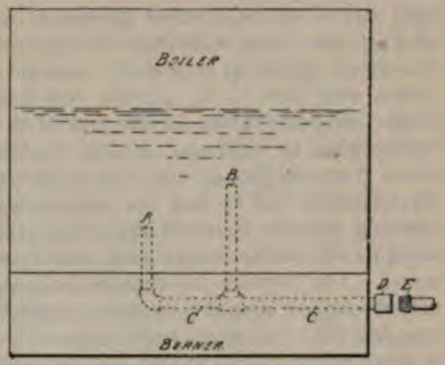


FIG. 2.

The reaches and rear axle have been strengthened by the addition of a triangular brace, which makes the gear much stiffer and stronger. All 1903 model vehicles will have the new Stanley mud guard, and the Hartford-Dunlop detachable tires are to be used exclusively. The steering rods have been made much stronger and have U-shaped tapering ends, this arrangement allowing the operator to take up all the wear and rattle in these parts. Another original feature is the fusible plug and low water alarm, which is constructed as follows:

A and B are pipes screwed into and extending up into the boiler 3 and 5 inches respectively. Both are connected to pipe C C, which has the fusible plug E screwed into the end of it at D and runs over the top of the burner. When there is the normal amount of water in the boiler a con-

THE 1903 MODEL OF STANLEY BROTHERS, NEWTON, MASS.

stant circulation is afforded in pipe C C, but when the water in the boiler falls below the top of the tubes A and B circulation ceases, and pipe C C, getting red hot, causes the composition in the end of the fusible plug to melt out, letting off the steam from the boiler and thus warning the operator that he has low water, and allowing him to shut off the burner, to prevent the boiler from being burnt or ruined. The carriage can then be stopped, the old fusible plug be unscrewed and a new one put in its place, or one may drive in another tap in the end of the old plug and put it right back again. Water can then be pumped into the boiler, the fire lighted and the carriage be started on its way again. (This operation is said to have been completed in eight minutes.)

The New Clutch of the "Champion" Gear.

The Champion Manufacturing Company, of 479 Hancock street, Brooklyn, N. Y., has brought out a new clutch which is furnished with their planetary gears. Formerly the high speed clutch was of the expanding ring type. A finger was employed to spread the ends of the ring and a tapered bolt was provided to make adjustments whenever the ring failed to grip. This clutch was illustrated in the issue of January 22, 1902, of The Horseless Age.

New Champion Gear.

With the peculiar construction which had been adopted it was not possible to take up enough, so that the expanding ring soon had to be replaced by a new and slightly larger one.

The new clutch is of a well known type, and consists of a metal disk which is forced against the wall that constitutes the other portion of the clutch proper. Between the two is a disk of vulcanized fibre which permits of the engaging of the clutch without making any noise. In the half tone the three dogs are shown which throw in the clutch as soon as the tapered sleeve is thrust in the direction of the device. The life of this clutch should be practically indefinite. From time to time it may become necessary to exchange the dogs, however.

The manufacturers state that owing to the use of jigs and gauges all the parts of their variable transmission gears are interchangeable.

A. C. A. Reliability Run. October 15. Price, 10 cents.

Book Review.

"Two Thousand Miles on an Automobile." By "Chauffeur." Published by the J. B. Lippincott Company, of Philadelphia.

Mr. Eddy's book, to which we have already referred repeatedly, is a very interesting narrative of an exceptionally extended automobile tour. He does not confine himself to what might be called the automobile part of the tour—the behavior of the machine and general observations on automobiles—but has woven into the account of the trip a large number of entertaining incidents of travel, geographical and historical notes relating to the towns and districts visited, and some philosophical dissertations on themes suggested by episodes of the trip. All of which goes to show that the tour was not made with the view of establishing records for speed and distance, but for the purpose of visiting places of interest and enjoying a pleasure trip in an automobile, the charm of which, according to the author, lies chiefly in the unusual contact with people and things which it occasions.

It is worth noting here, as characteristic of the rapid progress or changes in the automobile movement, that this long tour was accomplished in an 8½ horse power automobile, rather a contrast to the power rating of our present touring cars. The touring car model, which is now exploited so generally by manufacturers, was then still unknown, only a year and a half ago.

The first chapter is introduced with the statement that "Any woman can drive an electric automobile, any man can drive a steam, but neither man nor woman can drive a gasoline; it follows its own odorous will and goes or goes not as it feels disposed. For this very wilfulness the gasoline machine is the most fascinating machine of all." This chapter deals with generalities of automobile travel—popular interest in the new vehicle, the qualifications of drivers, necessity of repairs, conditions of storage in touring, etc. A few expressions of the author upon real and sham chauffeurs may here be repeated:

"There are chauffeurs and chauffeurs—the latter wear the paraphernalia and are photographed, while the former are working under the machines. * * * The sham chauffeur sits in front and turns the wheel, the real sits behind and takes things as they come; the former wears the goggles, the latter finds sufficient protection in the smut on the end of his nose."

"There is every excuse for relying helplessly on an expert mechanic if you have no mechanical ingenuity or are averse to getting dirty and grimy; but that is not automobiling; it is being run about in a huge perambulator."

In Chapter 2 the author describes the machine used, compares the American type with the French, speaks of clothing suitable for automobiling, baggage arrangements and other subjects relative to automobile touring. In Chapter 3 the account of the trip is begun. A brief account of the trip was published in The Horseless Age shortly after it had been completed. Suffice it to say here that during the first days the daily mileage was quite large, 170 miles the first day, for instance. Cleveland was reached in three days. There some repairs were made and then the journey continued. Few "reflections by the way" are made in this first part of the narrative. Perhaps the average speed kept up and the good behavior of the machine prevented chances for observation and unusual contact with people, or else the parts of the country run through are of less popular interest than those visited later.

In Buffalo some time was spent at the Exposition, and the machine was fitted with a lower gear for the bad and mountainous roads of New York State. The trip was now pursued in a more leisurely manner and more frequent and longer stops were made. In the following part of the narrative the author frequently deals with things observed in the various localities visited, historical events recalled by monuments or buildings, and with contemporaneous occurences and themes suggested thereby. The assassination of President McKinley, for instance, leads to some reflections on anarchism and nihilism; a strike in Worcester while the tourists passed there, to a discussion of the strike habit, etc. Much space is devoted to a chapter entitled "Lexington and Concord," which deals mostly with visits to the homes of persons famous in the literature of the country.

Mr. Eddy was in New York at the conclusion of the New York-Rochester Endurance Contest. "The stories told," he says, "by those who participated in that now famous run possessed the charm of novelty, the absorbing fascination of fiction. * * * Every man who started finished ahead of the others—except those who never intended to finish at all. Each man went exactly as far as he intended to go and then took the train, road or ditch home. * * * There were 156 dress suit cases on the run, but only one was used, and that to sit on during high tide in Herkimer County, where mud was deepest."

The book, we feel sure, will be read with relish by automobilists generally, for the author combines wit, keen observation and a broad view of the subject with a fascinating style. The book, moreover, should prove instrumental in stimulating interest in automobile touring.

The New York *Herald* reports that an international combination has been formed in the storage battery business which for all practical purposes will control the patents and manufacture of storage batteries in the United States, England and on the Continent. It is said that the deal was effected by New York financiers, who recently visited London for the purpose of settling the tobacco war.

IOR
NTION

ored that automobiles are to be ed at Fulton, Ia.

ıger Automobile Tire Company, J. J., has gone into receiver's

ımazoo Cycle Company, Michiıilding a $400 automobile weighunds.

umbus Motor Vehicle Commbus, Ohio, have five vehicles truction.

ımond Automobile Company, ı, Del., has been closed up unord's warrant.

ıorted that Oliver S. Oberlin, t, Pa., will erect a plant for the e of automobiles.

ey Automobile Company, Cohio, will begin the manufacture ary 1 of a 6 horse power single ıchine at $600.

r Winton states that the ignition racing machine was tampered the Detroit races, causing him event with the Ford-Cooper

uryea, of the Duryea Power has interested Waterloo, Ia., in the project of starting a tory there to produce Duryea

rstate Transit Company, which perating electric buses over the bridge between St. Louis and Louis, is constructing sixteen s to displace the electric.

organ has resigned the secre- the Autocar Company, Ardand gone to California to re- Clarke assumes the duties of ı addition to those of treasurer. llaher, for two years vice presigeneral manager of the Fourmont Company, of Philadelesigned to accept the position manager of the Mobile Comnerica.

Parker, president of the Harter Works Company, has also n president of the Indianapolis ompany and the Morgan & ımpany. J. C. Wilson will be ıiness manager under him.

ıdard Wheel Company, Terre, are to engage in the manufac400 pound gasoline automobile, $650. A hundred additional be taken on. The Standard has recently opened a branch ry in Brooklyn, N. Y.

eral Manufacturing Company that in future all Winton cars d with Diamond chains, 1⅛ inch ıch wide. The Federal ManCompany's chain factory at Indianapolis will ship 200 of these chains every month to the Winton Motor Carriage Company. This is no doubt the largest order ever placed for big car chains.

The Elmore Manufacturing Company, Clyde, Ohio, recently shipped a carload of their machines to Los Angeles, Cal.

The New York Society for the Prevention of Cruelty to Animals has ordered a second wagon from the Daimler Manufacturing Company.

The Pioneer Auto Company opened its doors November 1 at 54 and 56 West Forty-third street, New York, with J. A. Hands as manager.

The Locomobile Company point out that J. C. Reiniers, of Chicago, on a locomobile, won the 5 mile race for cars under 1,000 pounds at Grosse Pointe, Detroit, recently.

The Kings County Automobile Club, of Brooklyn, N. Y., was incorporated at Albany on October 25 by George A. Needham, Thomas H. Ivery, Charles L. Simmis, H. W. Robins and Alexander S. Farmer, directors.

C. J. Bailey Company, 22 Boylston street, Boston, have sold the English patent rights for their Bailey "Won't Slip" tires, and other rubber specialties, to the Clarkson & Capel Steam Car Syndicate, Limited, of Chelmsford, England.

The Bristol Motor Car Company, Bristol, Conn., whose incorporation was announced in our last issue, expect to have 9 horse power single cylinder machines ready for the market about January 1. The transmission will be of the sun and planet type, giving two speeds forward and a reverse.

The Western Motor Company, Logansport, Ind., successors of the Reutenber Manufacturing Company, has offered through the Central Trust Company, of Cleveland, Ohio, to file in Cass County, Ind., a mortgage for $250,000 on its plant for the purpose of issuing bonds to extend its business. The bonds, 250 in number and of $1,000, bear 5 per cent. interest.

On Saturday, October 25, the Lunkenheimer Company, Cincinnati, Ohio, formally opened their new plant, located near Brighton Station, in the section of the city called Fairmount, and are now moving out of their old factory on Eighth street. The new plant comprises five buildings, representing an investment of over $300,000. The main building, 180x130 feet, is three stories high and is so constructed that three more stories can be added without interfering with the progress of business. The roofs are of glass and clay tiling. A novel feature in the main building is the heating system, inasmuch as the hot air travels through the fourteen large hollow columns which support the floors around the area in the centre of the building. Another feature is the Nernst lamp system, a new and superior method of shop lighting, giving a light more closely resembling sunlight than that of any other known artificial source of light. Under it articles exhibit their true color. The area occupied by the plant is 3 acres, and 3 acres more have been acquired for future growth.

The Kunz Automobile Company, Milwaukee, Wis., has changed its name to the Speedwell Automobile Company.

It is reported that a Mr. Belfield will erect a building on West Sixty-seventh street, near Columbus avenue, for the storage of automobiles.

The incorporation of the Niagara Frontier Automobile Company, of Niagara Falls, N. Y., is announced. The capital stock is $25,000, and a building will be erected for the storage and repair of automobiles.

The Supreme Court at Washington last week denied the writ of certiorari of the Consolidated Rubber Tire Company against the Goodyear Tire and Rubber Company, in appeal from the decision holding invalid the Grant tire patents. This does not finally dispose of the case, however; it merely means that the case must take its regular course before the Supreme Court of Appeals.

The Imperial Automobile Company has been formed at Detroit, Mich., to build electric automobiles, by J. D. Book, chairman; D. J. Campau, vice chairman; Homer McGraw, vice chairman; R. O. Adams, secretary, and George J. Worthy, treasurer. The consulting engineers are Joseph Ledwinska and R. Fuller. Temporary offices have been opened at 1230 Majestic Building.

Dr. C. M. Taylor, Columbus, Ohio, has built a small shop on his premises for the repair of his automobiles and for general experimental work in this line. He has designed a steam machine showing a number of new features. The engine, boiler, gauge, oil feed and water pump are all located in front, where they can be seen by the driver at all times. A full description will appear in a later issue.

On November 1 the property, business and good will of the Peerless Manufacturing Company, Cleveland, Ohio, was transferred to the Peerless Motor Car Company, a corporation organized for the purpose of acquiring the plant and engaging in the business of manufacturing automobiles. The new company has assumed the performance of all the contracts of the old company, and the ownership and management of the business will be substantially the same as before.

The Cadillac Automobile Company, Detroit, Mich., has been incorporated with a capital stock of $300,000 by Clarence A. Black, Wm. H. Murphy, Lem W. Bowen, A. E. F. White and Mark Hopkins, to manufacture a single cylinder gasoline automobile. The plant of the old Detroit Automobile Company at Cass avenue and the railroad crossing will be occupied. Mr. Black is president, Mr. White vice president, W. H. Murphy treasurer, Lem W. Bowen secretary, and the sales department will be in charge of W. E. Metzger.

OFFICIAL RESULTS OF A. C. A.'S 500 MILE RELIABILITY CONTEST.

Official No.	Make.	Average Miles Per Hour.	Reliability Marks.	Per Cent. of Maximum.*	Remarks.
C 1	Packard	14	2,092	100	Qualified for the President's Cup.
C 2	Packard	14	2,089	99.8	
C 3	Packard	14	2,092	100	Qualified for the President's Cup.
C 4	Packard	13.75	2,034	97.2	
B 5	Prescott	14	2,092	100	Qualified for the President's Cup.
B 6	Foster	Withdrew at Hartford October 14.			
B 7	Lane	14	2,092	100	Qualified for the President's Cup.
B 8	Lane	14	2,085	99.7	
C 10	Haynes-Apperson	14	2,072	99.0	
B 11	Haynes-Apperson	14	2,092	100	Qualified for the President's Cup.
B 12	Haynes-Apperson	12.79	1,910	91.3	
B 13	Autocar	14	2,083	99.5	
B 14	Autocar	Withdrew at Worcester October 13.			
B 15	Ward Leonard	Withdrew at Meriden October 14.			
B 16	Ward Leonard	13.50	1,974	94.3	
B 17	Apperson	13.81	2,070	98.9	
C 18	Brazier	12.72	1,393	90.4	
A 19	Torbensen	7.97	1,146	54.8	
A 20	Pierce	14	2,088	99.8	
B 21	Darracq	14	2,091	99.9	Awarded the Hill Cup.
C 23	Apperson	13.63	2,021	96.6	
B 24	White	14	2,092	100	Qualified for the President's Cup.
B 25	White	14	2,092	100	Qualified for the President's Cup.
B 26	White	14	2,092	100	Qualified for the President's Cup.
B 27	White	14	2,092	100	Qualified for the President's Cup.
B 28	White	14	2,088	99.8	
C 29	Riker	12.68	1,895	90.7	
B 30	Stevens-Duryea	14	2,091	99.9	Awarded the Scarritt Cup.
B 3	Stevens-Duryea	13.90	2,073	99.1	
B 32	Rambler	14	2,088	99.8	
B 33	Grout	14	2,092	100	Qualified for the President's Cup.
B 34	Locomobile	13.68	2,022	96.7	
B 35	Locomobile	14	2,091	99.9	
B 36	Locomobile	12.25	1,848	88.3	
B 37	Elmore	14	2,087	99.8	
B 38	Elmore	13.65	2,031	97.1	
B 39	De Dion	14	2,082	99.5	
B 40	Autocar	12.65	18,67	89.2	
A 41	Oldsmobile	14	2,070	98.9	
C 42	Searchmont	14	2,092	100	Qualified for the President's Cup.
C 43	Packard	13.11	1,813	86.7	
B 44	Darracq	8.65	1,262	60.3	
B 45	Franklin	14	2,086	99.7	
B 46	Knox	12.03	1,798	85.9	
B 47	Knox	14	2,092	100	Qualified for the President's Cup.
B 48	Knox	14	2,091	99.9	Awarded the Chamberlin Cup.
B 49	Fiat	12.28	1,812	86.6	
C 50	Neftel	Withdrew at Norwalk October 9.			
B 51	Stearns	14	2,027	96.8	
C 52	Winton	14	2,090	99.9	
A 54	De Dion	Withdrew at Boston.			
B 55	United States Long Distance	14	2,090	99.9	
B 56	United States Long Distance	13.11	1,918	96.5	
A 57	Pierce	14	2,085	99.7	
B 58	Rambler	13.74	2,022	96.7	
C 59	Winton	14	2,074	99.0	
B 60	Grout	14	2,087	99.8	
B 61	Grout	14	2,081	99.5	
C 62	Toledo	13.92	2,079	99.0	
A 63	Oldsmobile	14	2,092	100	Qualified for the President's Cup.
A 64	Oldsmbobile	14	2,088	99.8	
B 65	Automotor	13.84	2,044	97.7	
C 66	Panhard	14	2,082	99.5	
C 67	Searchmont	14	2,092	100	Qualified for the President's Cup.
B 68	Fredonia	14	2,092	100	Qualified for the President's Cup.
B 69	Fredonia	Withdrew at Worcester October 13.			
B 70	Foster	–	2,092	100	Qualified for the President's Cup.

*Not official.

Make.	Average Miles Per Hour.	Reliability Marks.	Per Cent. of Maximum.*	Remarks.
De Dion	12.61	1,885	90.1	
Foster	10.81	1,547	73.9	
Thomas	Withdrew, broke down, Baychester, October 9.			
Rambler	13.82	2,070	98.9	
Searchmont	14	2,092	100	.........Qualified for the President's Cup.
Rambler	14	2,084	99.6	
Oldsmobile	13.89	2,049	97.9	
Foster	13.83	2,070	98.9	

CERTIFICATES.

Class—12 to 14 miles per hour, sixty-five vehicles, as per list.
l Class—10 to 12 miles per hour; No. 73, Foster.

Third Class—8 to 10 miles per hour; No. 44, Darracq.
No. 19—Finished, less than 8 miles per hour.

*Not official.

nent of Space at Chicago Show.

Motor Carriage Company, 1 to 4 sive.
. Co., 5 to 8 inclusive.
F. B., Company, 9 and 10.
eorge N., Company, 11 and 12.
er Brothers Manufacturing Com- 13 and 14.
Motor Car Company, 15 and 16.
Automobile and Manufacturing pany, 17 and 18.
E. R., Motor Company, 19 and 20.
Vehicle Company, 21 to 24 and 37 inclusive.
ile Company of America, 25 to d 41 to 44 inclusive.
omobile Company, 29, 30, 31.
Searchmont Automobile Com- 32.
Automobile Parts Company, 33.
Brothers Automobile Com- 34.
& Bowman Automobile Company, d 36.
onal Motor Car Company, 49 to d 65 to 68 inclusive.
mple & Austrian Company, 53 to d 69 to 72 inclusive.
tor Works, 57, 58, 73, 74.
Apperson Company, 59 and 60.
l Automobile Company, 61 to 64 sive.
Henry C., 75 and 76.
Automobile Company, 77 and 78.
Automobile Manufacturing Com- , 79 and 80.
Company of America, 81 to 84 in- ve.
y & Hubbs Manufacturing Com- , 85.
Thomas B., Company, 87 and 88.
Vehicle Company, 89 and 90.
Automobile Company, 91 and 92.
ourg Brothers & Alliger, 93 and
otor Car Company, 95 and 96.
nufacturing Company, 100.
n Wheel Works, 101, 102, 103.
or Company, 107.
J., Arms and Tool Company, 108.
utomobile Company, 109.
anufacturing Company, 110.
Manufacturing Company, 111.
Motor Carriage Company, 112, 113.
Triumph Automobile and Launch Company, 118, 119, 120, 121.
Veeder Manufacturing Company, 124.
Shelby Steel Tube Company, 125.
Firestone Tire and Rubber Company, 126.
Whitney Manufacturing Company, 127.
Standard Welding Company, 128.
Gray & Davis, 129.
Dixon, Joseph, Crucible Company, 130.
Rose Manufacturing Company, 131.
Timken Roller Bearing Axle Company, 132.
Twentieth Century Manufacturing Company, 133.
Fisk Rubber Company, 134.
Brennan Manufacturing Company, 135.
Hoffman Automobile and Manufacturing Company, 138, 139.
Goodrich, B. F., Company, 140, 141.
Badger Brass Manufacturing Company, 142.
G & J Tire Company, 144, 145.
Peterson, K. Franklin, 146, 147.
Dasey, P. J., & Co., 148 to 151 inclusive.
Brecht Automobile Company, 152.
Diamond Rubber Company, 153.
Merkel Manufacturing Company, 154.
National Carbon Company, 155.
Hartford Rubber Works Company, 99.
R. E. Dietz Company, 136.
Electric Storage Battery Company, 123.
Woods Motor Vehicle Company, 113, 114.

...OUR... FOREIGN EXCHANGES

The firm of De Dion et Bouton is said to have no less than 250 spare part depots in France.

The Automobile Club of South Africa has elected as its president Sir Walter Hely Hutchinson, Governor of the Cape Colony.

A petition in favor of the British Registration of Motor Vehicles bill is to be presented to Parliament on behalf of the Scottish Trade Protection Society.

On October 11 the judges in the tire trials of the A. C. G. B. and I. witnessed the removal and replacement of selected tires on the vehicles which had completed the 4,000 miles, so they might judge the relative practicability of performing these operations with the various sizes and makes of tires entered for the trial.

The Technical Committee of the A. C. F. at a meeting on October 8 decided to postpone the trials of automobiles for city and suburban use from the end of October to the end of November.

The standard Minerva motor for the 1903 season will have a bore of 66 and a stroke of 70 millimetres, and will develop 2 brake horse power. Among the new features are mechanically operated inlet and exhaust valves.

The suppression of the Gaillon hill climbing trial has been found to have been due to an oversight of the organizers. The latter had secured the permission of the Ministry, but had failed to request the permission of the prefect of the department. The latter official was furious that he had not been consulted, and he forbade the run.

A suggestion has been made to the A. C. G. B. and I. by Alfred Harmsworth that the club should organize a trial of appliances to prevent skidding. The club now intends to learn from members what sorts of pavements are most liable to cause the skidding of vehicles with pneumatic tires and to publish road maps in which roads with such pavement would be indicated.

Upon the initiative of the Austrian Automobile Club the holding of an international congress of all the leading automobile clubs, to be held during the Paris Automobile Salon in December, is under consideration by the Automobile Club of France. The chief object of this congress would be to prepare rules for automobile racing which would be of an international character.

The records made on the track at Deauville some months ago have been declared void, it having been found that the watches of the timekeepers did not agree. Vanderbilt's record of twenty-nine and two-fifths seconds becomes the official time for the kilometre on the Continent. Jarrott's record at Welbeck stands as the world's record, with the proviso that the course at Welbeck is slightly down hill.

MOTOR VEHICLE PATENTS..

United States Patents.

711,537. Storage Battery.—Frederick Sedgewick, of Chicago, Ill. October 21, 1902. Filed August 2, 1902.

The electrodes are formed from a multiplicity of exceedingly thin juxtaposed sheets or parallel layers of lead foil, each layer having minute punctures therein of such number and such fine comminution as distinguished from mere holes or perforations and so closely assembled as that when the films are juxtaposed either in separate sheets or as a continuous roll they may form a cellular mass, thereby imparting to the electrode the characteristics of a fine sponge or lamp wick, so that it may not only be capable of absorbing the electrolyte by capillary action and permitting a free circulation thereof, as well as the ready escape of any gases formed, but will also present a maximum surface to be acted upon by the electrolyte.

The sheets or films of each electrode are soldered at the top to a lead binding strip, to which are attached lugs for the positive and negative electrodes.

711,980. Machine for Equipping Vehicle Wheels with Rubber Tires.—Alvaro S. Krotz, Springfield, Ohio. October 28, 1902. Filed August 3, 1901.

712,033. Wheel Tire.—Harry Barnard, Hamilton, Canada. October 28, 1902. Filed April 21, 1902.

712,058. Driving Mechanism.—Alfred M. Gloag and Robert W. J. Fletcher, Edinburgh, Scotland. October 28, 1902. Filed July 15, 1901.

712,178. Separator for Storage Battery Plates.—Rufus N. Chamberlain, Depew, N. Y. October 28, 1902. Filed May 13, 1901.

712,293. Pivoted Hub.—Jacob H. Genter, Albany, N. Y. October 28, 1902. Filed December 3, 1901.

The $5,000 damage suit of Bernard Stubbe, a tailor, of Cincinnati, Ohio, against George H. Ingalls, son of President M. E. Ingalls, of the Big Four, for automobile injuries, has been settled out of court.

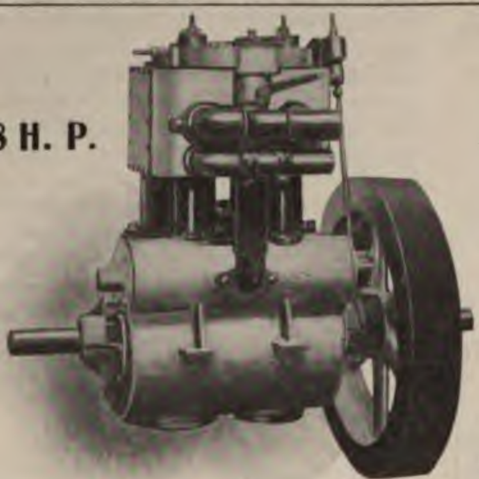
At the recent Gaillon Hill Climbing Trial a Serpollet vehicle climbed a distance of 1 kilometre in 36 seconds, corresponding to a speed of 100 kilometres per hour. The vehicle weighed 2,100 pounds and was driven by Leblond.

A North Welsh paper mistakes the object of sprinkling roads with oil, writing in reference to this subject: "As if motor cars do not travel fast enough already without having the roads greased for them, we are threatened with this additional horror."

A pipe joint cement claimed to be as effective as red lead putty for either faced or rough flanged pipe joints and which costs only about one-tenth as much consists of a mixture of ordinary pine tar and iron oxide (fine borings or turnings well rusted will answer the purpose) mixed to a stiff paste. It does not harden so quickly as red lead putty and is very adhesive under pressure.

The Waterbury Brass Company, of 122 to 130 Centre Street, New York, do a good deal of business with the automobile trade in copper and brass sheet and tubing, soldering irons, etc. Most of their goods are carried in stock for immediate delivery upon receipt of order; they always carry a stock of one-half inch outside diameter, No. 21, Stubbs gauge seamless copper tubing in lengths of 14 feet.

VOLUME IX.
of the Horseless Age, bound with or without advertisements, $5.
The Horseless Age,
Times Building, New York.



8 H. P.

THE BUCKEYE MOTOR.

SINGLE AND DOUBLE CYLINDER GASOLINE MOTORS FOR AUTOMOBILES,

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THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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HE HORSELESS AGE.

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Doctors' Number.

On January 7 next we will issue a Special Number devoted to the use of the automobile by physicians in their professional work. Among the readers of THE HORSELESS AGE there are many physicians, some of whom regularly employ automobiles in their practice, and many others are contemplating the step. The contributions on this subject which have already appeared in our columns have shown that under proper conditions the automobile is thoroughly practical for this work. Our object in issuing this Special Number is to present further facts regarding the use of motor vehicles in this field, and to interest a larger circle of medical men who may as yet have given little thought to the subject; and to this end the number will be circulated extensively among physicians throughout the land, especially in districts where the roads and other conditions are favorable to the use of automobiles.

In this connection we solicit suitable contributions from medical readers who have used automobiles in professional work, and who can write upon the subject from actual experience. While we wish to hear from our former contributors, we expect to introduce to our readers many new ones, as it is our intention to deal with the subject thoroughly, giving accounts of experiences with various types and classes of vehicles and in all seotions of the country.

The medical profession are even now among the best customers of the automobile trade. We are convinced that this field for the application of automobiles will be permanent, and that it is even now capable of great extension. It is with a view of promoting this extension that this Special Number is planned.

Electrolytic Current Rectifiers.

The recharging of automobile batteries in small towns and in outlying city districts is considerably hampered by the fact that in such localities the electric supply is usually on the alternating current system, which is not adapted to charging batteries. The only way in which the energy from such circuits can be made available for charging storage batteries is through the use of an alternating direct current transforming plant, which ordinarily consists of an alternating current motor driven by current off the mains, driving a direct current generator, which furnishes current suitable for charging the battery. Such a plant is both high in first cost and rather inefficient in operation, the high first cost being the main objection.

A number of mechanical rectifiers consisting of commutators driven by small synchronous motors in strict synchronism with the alternating current have been devised from time to time, but they do not seem to have been very satisfactory and have never come into extensive use.

The latest device for employing alternating current for storage battery charging is what is known as an electrolytic rectifier. It has been known for a number of years that when an alternating current is sent into an electrolytic cell with aluminum electrodes the impulses in one direction are stopped and those in the opposite direction are allowed to go through. The application of this principle to storage battery charging immediately suggested itself, but though the experiment has been made the apparatus has never come into extensive practical use. For large stationary batteries the efficiency of the apparatus is undoubtedly too low to make it practicable; and for charging automobile batteries no one may have thought it profitable to work out an apparatus specially for that purpose.

Recent newspaper reports from Madison, Wis., convey the information that Prof. C. F. Burgess and Carl Hambuchen, of the Wisconsin University College of Engineering, have invented a new electrolytic rectifier, consisting of aluminum and iron electrodes in a bath of fused sodium nitrate. The device, suitable for charging an automobile battery, is described as very compact and weighing only 25 pounds, so that it can be conveniently carried along in the vehicle. The efficiency is claimed to be 60 per cent. Nothing is said about how the nitrate is to be fused in the first place, but it is to be presumed that this is accomplished by heat from an external source. The low efficiency is easily accounted for

by the fact that there must be a great deal of radiation from a vessel containing fused sodium nitrate. Those who have had experience with fused electrolytes may doubt the practicability of such a device in the hands of a layman. On the other hand, if reliability can be proved there would no doubt be a considerable demand for the device, in spite of its inefficiency.

The Gordon Bennett Cup Race.

According to the conditions of the annual competition for the Gordon Bennett cup prospective contestants must file application for appointment on their country's team with the recognized automobile club of that country before the first of January. This time drawing near, the subject of the probable representatives of the different countries is receiving considerable attention in the European automobile press. The Automobile Club of France, of course, will have no difficulty in finding eager contestants enough to put a full team in the field. In fact, the prospects are that, as was the case last year, there will be much rivalry between the French manufacturers to secure a place on the team, and a preliminary contest to determine the cup racers may become necessary, in view of the complaints made after last year's race that one make of vehicle representing the French club had never contested in a race previous to that event.

Germany, it appears, will be represented, and England apparently counts on those manufacturers who entered for the race last year. A number of American manufacturers are also mentioned as figuring on contesting, though it seems no definite statements to this effect have been made by the parties concerned. No information of this kind has been received at this office, and we doubt very much whether an American team will be put in the field.

On the other hand, nothing is yet known as to where and under what conditions the race will be held in 1903. According to the rules of the cup contest, the race is to be run in the country which at the time holds the cup—i. e., in this case, England. Now no road race has ever yet been held in England; the law forbids such races, and a special act of Parliament would be required to permit such an event. With the present state of public sentiment in England such an act is not very likely to pass, and the organizers will probably either have to change the scene of the contest or else modify it in such a manner that it will not come in conflict with the laws in force. It may therefore be necessary to hold the race on a track.

Automobile and Horse Regulations.

In automobile speed cases the defense is sometimes made that the speed regulations are unconstitutional because they discriminate against automobiles. We do not believe this defense has ever been successful and fail to see any sense in the plea. The automobile laws under which the arrests are made may be improper and unjust, but if so it is not for the reason that they are not the same as horse regulations, or that automobiles are subject to regulations where horse vehicles are not.

Automobiles and horse vehicles are entirely different in their nature, and if regulations are to be of any practical value they must be made specially for each class of vehicles, with a view to the characteristics of that class. In most places where regulations regarding the speed of vehicles are in force the limit is so low that automobiles are at a disadvantage. There is, of course, little difference in the limit of speed at which it is safe to travel for automobiles and horse vehicles in very congested thoroughfares, as these limits are chiefly determined by the conditions of traffic. But on streets on which there is little traffic and in all the smaller towns the automobile, owing to its more perfect control, can safely be run at a speed which would be dangerous for horses. Especially will this be the case when horses become more thoroughly familiar with automobiles, and for this reason alone automobilists will do well not to insist on uniformity of regulations for automobile and horse traffic.

Comparison of Certain 1902 Design Automobiles with Others Made in 1901 and 1902.

By George Otis Draper.

In 1901 I ran two steam machines and one gasoline. In 1902 I have had one steam machine and one gasoline machine. It may be interesting to note the relative troubles.

THE GASOLINE MACHINE.

In 1901, my first purchase, a gasoline type weighing about 1,900 pounds, had 8 horse power, three cylinders, jump spark, and carrying capacity of four by the use of a broad rumble seat. My 1902 gasoline machine weighs over 2,000 pounds, is of 15 horse power, two cylinders, jump spark, and tonneau design. The machines are not of the same manufacture. The 1901 machine gave constant trouble with dirty spark plugs; in fact, I only had two fairly long trips three cylinders worked constantly. The plugs needed cle every time the machine was used sometimes got dirty while starting th gine. The present machine gives no t in this line whatever. I run for s hundred miles without even looking plugs. This, to my mind, is charact of this one make alone, as I note tinued trouble in this direction from makes of machine on which difficulti reported by users.

The 1901 machine had three trem and the cam and parts were placed it was almost impossible to effect c adjustment and keep them clean. present machine has one trembler while it requires more or less attent keep it in proper order, is most conver arranged. The throttle on the earl chine worked by hand when it worl all, and the connections were so bad signed that it broke and was ne order.

The present machine has a foot th which not only works perfectly, but mind gives the best sense of cont any gasoline machine I know of. controlled by a spring so as to shut power immediately the foot releases i early machine used storage batterie spark, which were quite unreliable an expensive. The present machine us cells, the first double set of which r in one month's time, and both togeth very possibly this was due to the fa there was a loose piece of metal sl around on top of the cells, and p short circuiting them. I had no t with the wiring of the first ma whereas the present machine gives trouble by the wires breaking, throu jar or motion of the machine, I su The early machine was steered by a lever, the present one by a wheel. no hesitation at all about preferrir wheel system, and should want it o type of machine, whether steam, elec gasoline. In the first machine the used to clog up very badly. The p muffler does not clog, and can be by a hand lever, giving extra power f climbing. Both machines break chai frequently. No trouble was exper with the water in either type, althou present one uses up more water. Th tem of adjusting the flow of gasol the present machine is practically p while the older machine gave co trouble. The present machine has buretor for each cylinder, while other type one carburetor had to do three cylinders. The first machine h automatic oiling device, and the amo cylinder oil was either too much little at all times. The present m oils automatically, and has only trouble once by an oil vent cloggi see no difference in the tires as yet cially as the present machine has no sustained puncture. The early m sucked a valve into the engine, resul a heavy bill for transportation and

new one has given no trouble in tion. The older machine was so tory in so many respects that I to sell it finally for 25 per cent. rchase price. The present one :s me very well, and I expect to :t year.

THE STEAM MACHINES.

ring the steam machines, my ar type is of the large, heavy de- : method of lighting the burner ferable to anything I have seen machines, and the difficulties to been mainly with relation to ıe air system in working order, 'ater gauge glasses tight, and a minor details. A siphon for water tank has proved of great question whether the heavy steam have sufficient power to compen- he extra weight. They use so er that the water pump takes le power, and the machine will ı moderate hill at any speed with on and the steam off.

h in my experience with three m machines I never burned a once (and then owing to an- :elessness), I find a water tube ainly relieves one of great anx- :ral times the water has been exhausted in the present ma- ı no damage whatever.

CONCLUSIONS.

pose these letters from users are › aid the purchaser more or less , my general conclusions are that afford it, the heavy type of gaso- ne is far preferable for general ng runs. Personally, I should ast 20 horse power if choosing hine, and would prefer 24. Com- lower priced machines, the s to whether one shall have a , light gasoline machine, or a hine at similar price, is hard to one is purchasing for constant actical utility, it is very possible ısoline type is preferable, espe- ıs that have simplicity of parts, are such in the market. If one for pleasure trips and does not 'est in the more expensive ma- 'e is still a question in my mind ther a steamer has not certain advantages. There is a reserve r spurts and hill climbing, which leasant to control. I believe the ign of all these steam carriages greatly improved by adding at t of wheel base, and using a ing mechanism.

g on the general subject about a was converted in advance to the ign of gasoline automobile, with in front. After using a type : horizontal engines, however, I that the forward engine has any antage. I believe the horizontal gn with balanced cylinders runs less noise and jar than the front ıere is really no difficulty in getting at the parts, and I believe the forward engine, with the great weight over the front axle, makes the automobile jolt more on a rough road.

LIGHT YOUR AUTO BARN WELL.

Many purchasers of automobiles already keep horses, and frequently arrange for extra automobile space by building on something in the way of an addition. From my own experience, I can earnestly recommend that such additional space be well lighted. In my own case the addition has windows in the roof, the interior is painted white, and I have electric lights arranged on cords so they can be used inside the machine itself, if necessary. A zinc drip pan is very convenient, and one can be used with a slight bead at the edges so as to be placed in any convenient position for the automobile to be run in over it.

Some Details of Construction in Gasoline Motors.

By Hugh D. Meier.

Designers of automobiles are not inclined to incorporate complicated details in their designs if only a slight advantage is gained thereby. When adjustable bearings were discussed in the columns of The Horseless Age some draftsmen may have shrugged their shoulders at them, since they suggested carefully machined steel wedges, sectional boxes, set screws, etc. Steel wedges are out of the question, because they must be planed and fitted, and this would increase the cost of production to a marked degree. Brasses that consist of corresponding halves can be taken up by means of bolts after the boxes have been filed down or scraped where they bear on each other. A great many bearings are not divided. This is true of the main engine bearings of all those explosion motors which have an enclosed crank case divided midway between the bearings. This applies to all such bushings of variable speed gear cases that are of a single piece. If a bearing is to be adjustable and inexpensive to make, it must be lined with a bushing and must not contain a box. Segmental boxes permit adjustments within a good range. Split bushings cannot be sprung much, and, therefore, only a small amount of wear can be taken up. If a divided bearing is not wanted, and adjustment is desirable, one can only resort to the split bushing in this line of work. The simplest way to take up the wear is to force a screw against the bushing. This is also the poorest way, because in all such cases where the wear is even, or approximately even, it does not fulfill requirements at all, and the set screw is liable to work loose.

The crank shaft bearing in Fig. 1 is of the adjustable type, and is equipped with a tapered, split bushing. To take up the wear, it is provided with a nut which forces it into the tapered socket. In this way the bushing is closed up. Its slotted opening is not indicated in the sketch. To prevent the bushings being placed in such a way that the metal adjoining the slot is subjected to greater wear than other portions of the bushing, it is necessary to mill a groove into the latter and provide the hub portion that embraces the bush with a small feather. The oil hole will then always be right as long as it is drilled in the proper place. Should the metal near that hole be relieved, as shown, it is not necessary to make a point of the relative position of this orifice.

The only way to reduce the weight of counter weights is to put the metal where it belongs, i. e., as far away from the axis of the shaft as is compatible with good construction. The tendency is to make the outer portion as wide as the connecting rod and the walls of the crank case will permit. No effort has been made to present the best form of counterweight in the sketch, but to show two ways of securing them to a solid crank shaft. The counter weight adjoining the bearing is secured by means of studs, which are screwed into the crank arm. Nuts are provided to hold down the casting. To guard against their coming loose the studs are riveted over. Portions of the screws that project into the crank arm are frequently screwed down

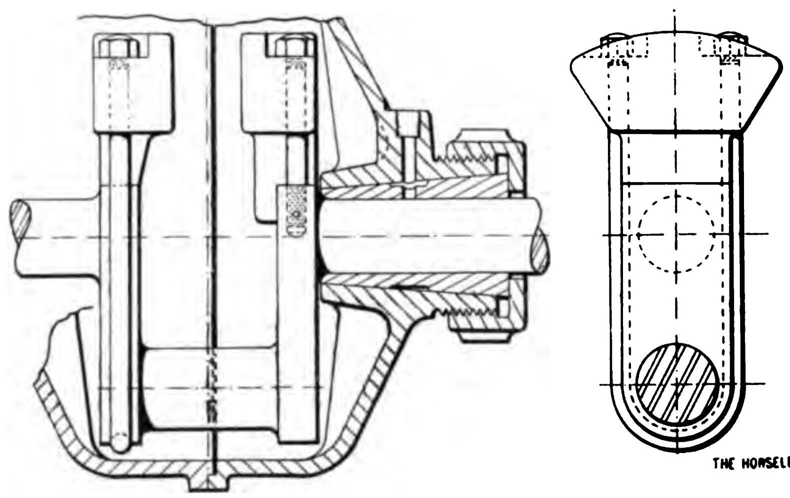


Fig. 1.

until they bottom, which may be better than to screw them down until they shoulder. However, it is not wise to rely on such a method of securing the studs, but to either pin them or else rust them in with litharge and glycerine or a solution of sal-ammoniac. Cap screws are better adapted to securing counter weights than stud bolts, because machinists are liable to rivet the latter over without holding the nuts firmly with a wrench. A bolt may be riveted over so that it keeps the nut from unscrewing, and yet the latter may not secure the counter weight properly. A little play will cause a disagreeable knock when the motor is running, which the operator may try in vain to locate in the rod bearings.

In Fig. 1 a front and side elevation of a method of securing a counter weight is illustrated. This construction has been adopted by a number of leading builders of stationary internal combustion engines in this country. The stud bolt is bent much like a horseshoe, and is equipped with nuts, which are secured by the bolt itself, its ends being riveted over. In the drawing is shown a groove (dotted lines) in the crank arm, and the bolt is placed in this groove. A cheaper method is the following: Spread the bolt so that it fits over the crank arm, which latter is to have no groove, and drive two small dowel pins into the counter weight, which are to project into the crank arm. If a lip is cast on to the counter weight (see first type) one dowel pin will do.

Most motors used on motor cycles are located in the frame in such a way that the crank hangers must be bent outward and the pedals must be spread. The over-all length of the crank shaft must be reduced to a minimum. It is desirable, however, to have as long a crank pin and as long journals as conditions will permit. Some of our single and opposed cylinder horizontal motors located under the bodies of vehicles are very much cramped. A good sized flywheel and a two or three speed gear must be accommodated in addition to the frame of the engine. In the cases cited, in fact in every motor that is intended to propel an automobile, it is desirable to have long journals and still bring the centres of the journals close together. The designer of a bicycle motor solved this interesting problem in the simple way shown in Fig. 2. The width of his connecting rod was a given quantity, and he wished to make his crank pin long to reduce the specific pressure on it. With these ends in view he bent the arms of the crank so that the rod could just swing between them without brushing, and then turned up his shaft.

In an automobile motor with but a single cylinder $1\frac{1}{2}$ inches can be gained, provided that a is equal to three-fourths of an inch. The distance b between the centres of the journals can be reduced by the same amount, or each journal and its bearing be lengthened by that much without adding to the over-all width of the frame. A shaft of this type is not so liable to have its crank pin broken as a shaft of the ordinary type (with straight arms), both pins being of the same length, diameter and metal, under the same conditions of service, because in the former the distance between the journal centres is less than it is in the latter. The bend in the crank arms is determined by the width of the connecting rod, the length of the crank pin, the throw of the crank, the width of its arms and the amount of space required to allow for suitable bearings and rod boxes.

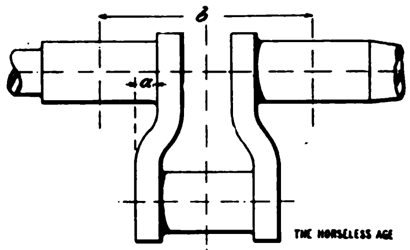


FIG. 2.

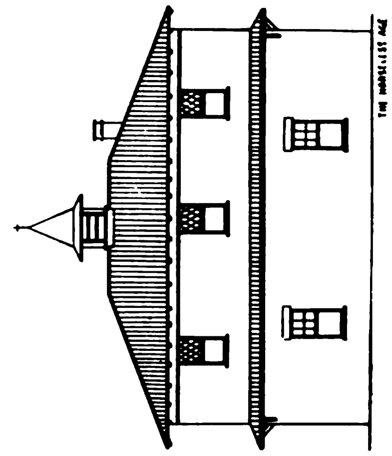
For structural reasons it will not do to make sharp bends in the crank arms, which need not be any heavier than straight cranks wherever the arms are properly bent. In this type of crank shaft the crank arms can only be finished all over at a great expense. It would be an expensive shaft to make out of "the solid." Hence it must be a drop forging, and as such it is only adapted to machines that are of a standard design, and which are produced in quantities. The crank arms need only be finished where they are in contact with the boxes of the rod or the bushings of the bearings. This finish is given the shaft in the lathe at the same time that the journals and the crank pin are being turned up.

In multiple cylinder engines the amount saved in over-all length is not in proportion to the saving made in single throw shafts with bent cranks. If the crank pins of a double throw crank are set at 180 degrees and there is no bearing between them, the arm that connects the pins should be straight. If the short arms are bent the saving in length is equal to that of a single crank. Where a bearing is interposed between the two cranks there are four arms, all short, which can then be bent. The distance between the centres of the crank pins will not exceed that of the shaft just mentioned by an appreciable amount.

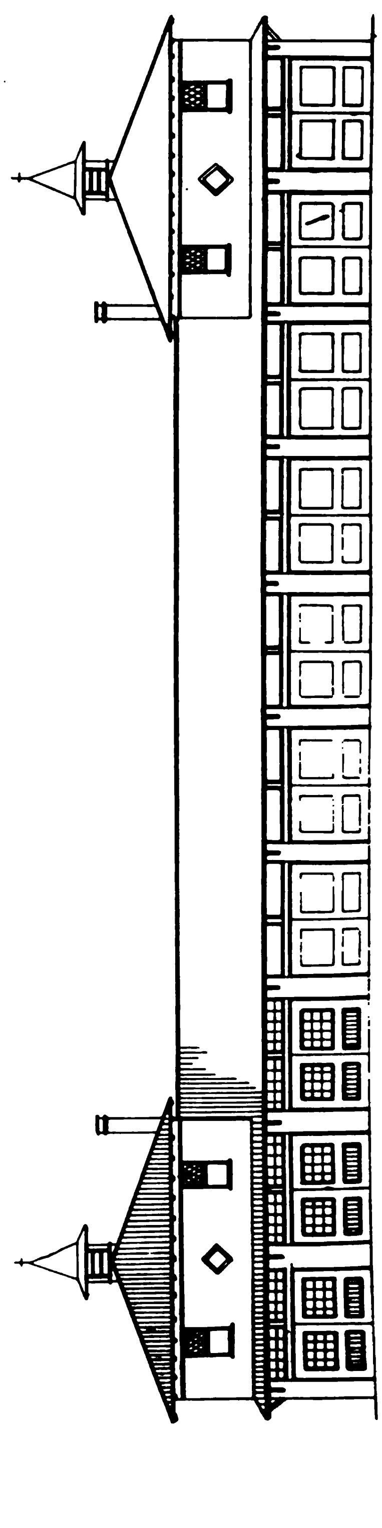
The Proposed Auto Stables of the Pratt Estate.

The management of the Pratt Estate, of Brooklyn, N. Y., purposes to erect a series of automobile stables, illustrations of which are here shown. It has instructed the Morris Building Company to have plans drawn up of suitable buildings, and has selected a site on Emerson place, near Willoughby avenue, Brooklyn. The architect is Hobart A. Walker, of 31 Nassau street, New York.

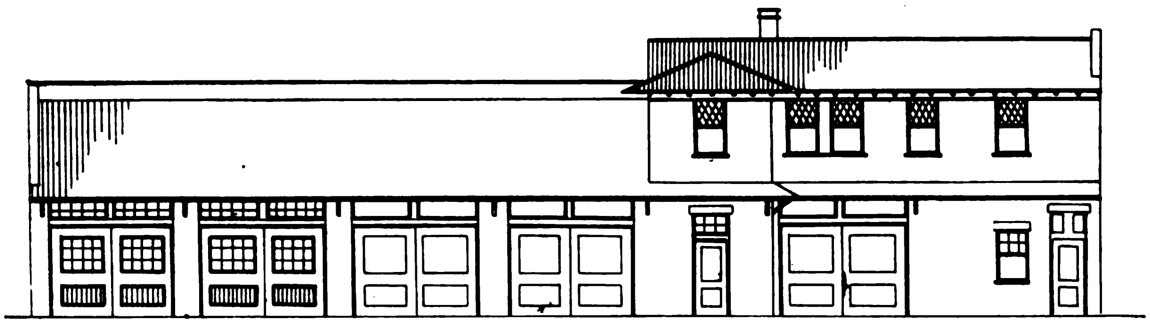
The stables consist of two buildings, the



END VIEW.



FRONT ELEVATION OF PROPOSED ROW OF AUTO STABLES OF THE PRATT ESTATE.



Elevation of Smaller Building.

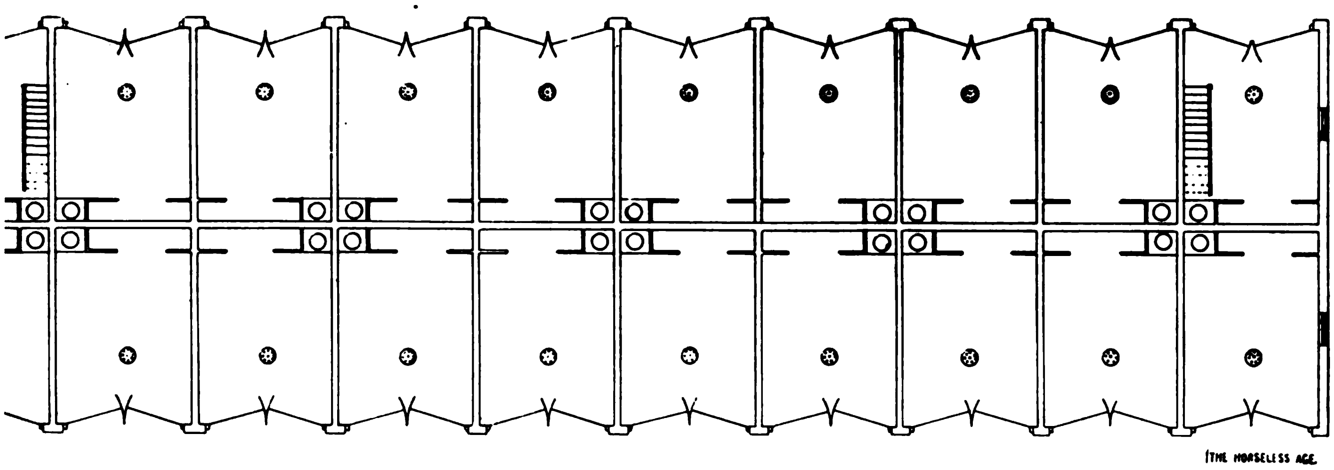
›ne oi which contains four indi-
ables and a repair shop on the
floor. Above the shop are the
that the superintendent and his
e to occupy. Only a side eleva-
the smaller building is shown.
e two plan views, a side and an
tion of the longer building. The
ound floor of the latter is given
individual stables, twenty in all,
e 14 feet wide and 20 feet deep.
npartment can accommodate two
:hines. There are no doors in the
ich reach to the roof and consti-
partitions between the reposi-
ince the roof is of corrugated iron
ıflammable material is to be used
nstruction of the buildings, a fire
the stables cannot spread. The floors of the stables will be cemented and drainage is to be provided for. Each stable compartment has two closets and a wash basin. Hot and cold water will be provided for. At either end the longer stable is to provide quarters for some of the motor servants. Each of these upper floors is to be divided off into three bedrooms, a dining room, kitchen and bathroom, as well as four closets.

The charging of electric vehicles is to be done in the repair shop, where a generating set and charging board are going to be installed. Should the managers of the estate decide to embark in the business of storing, repairing and charging automobiles, the buildings will be erected without delay and will be ready for occupancy before the next season opens.

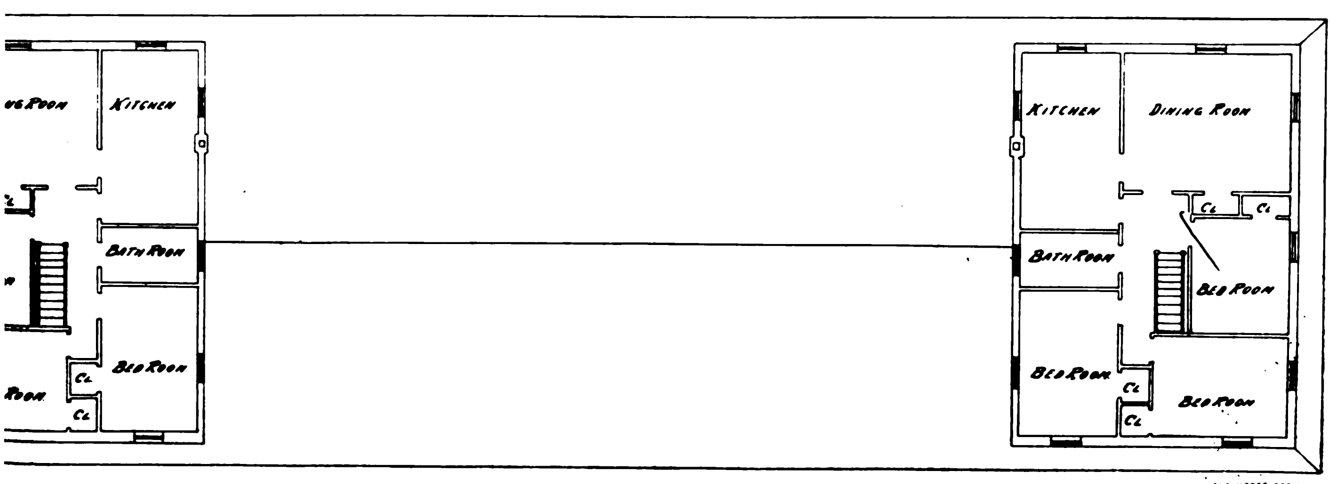
New Garage for Providence.

An old livery station at the corner of Pine and Garnet streets, Providence, R. I., is being torn down, to be replaced by an up to date automobile storage station having a floor space of about 15,000 square feet. The headquarters of the Rhode Island Automobile Club are in the Crown Hotel, adjacent to the new garage.

The county clerk of Clinton County, Ill., residing at Carlyle, writes that there has been but one automobile owned by a resident of that county, and he sold his machine because it caused several runaways with serious consequences. One horse died of fright when meeting it upon the road.



Plan of Ground Floor of Larger Building.



Plan of Second Floor of Larger Building.

LESSONS OF THE ∴ ROAD ∴

A Trip to New York.

By Chas. E. Duryea.

The girls had spent their vacation at Bayside, L. I., and were ready to return, but railroad fare costs money. Wife longed to go shopping in New York, although just why, a mere man cannot be expected to know, for, surely, there are opportunities enough closer by; while the writer, having an insatiable longing to explore new roads, is always ready for a tour when opportunity offers. Summer was behind us, however, and the hoped for month's vacation not in sight, but Labor Day offered an excuse and the only thing lacking was a vehicle. About this time "another of those bumping engines" came along in a tonneau, so we gladly embraced the opportunity to drive it into submission, as well as find out by trial whether one of our vehicles would run on good roads or not. We started Friday afternoon about 3:30, but were stopped at the edge of the town by a telephone message asking us to wait for a messenger—"important business."

GENERAL INSPECTION.

While waiting we took our first look at the vehicle to learn its condition and what we had aboard. We found the front tires rather soft and a pump that did not fit—facts not designed to increase one's peace of mind. It was almost 4 o'clock by the time the messenger caught us and we were ready to go forward. We headed as nearly straight east as possible, intending to pass north of Philadelphia in the hope of finding a shorter way to New York, even if not a better one, and reached Boyertown, 19 miles, at 5:05, having stopped four minutes to allow two four horse teams to get past us. Here another stop of two minutes for a scary horse was made and we passed New Hanover at 5:20. A little further the road forked in a manner not shown by our map, so we stopped at the nearest house and inquired. We also examined the oil cups and refilled them, not knowing whether they had been filled at starting or not; time lost, thirteen minutes, including a wait while a herd of cattle were driven past. We took the road to the northward, passing Obelisk at 5:50; Waldon at 6:10, where we found a pike leading toward Philadelphia along the Perkiomen River. We followed this for a mile, then were directed across the river to Springmont, arriving at 6:15. Two stops to inquire took three minutes, and at 6:45 we reached Harleyville.

In this part of the world all roads lead toward Philadelphia, and the cross roads seem to come wherever convenient and lead nowhere in particular, so that we had been zigzagging back and forth since leaving Waldon, and as evening came on the zigzags seemed worse than ever. We passed two more toll pikes, having to pay 3 cents for three-quarters of a mile on one of them and spending nearly one-third of the time inquiring our way, arriving at Hatfield shortly after 7. This is the scene of a disastrous wreck on the P. & R. Railroad about a year ago, and contains two hotels, at one of which we secured excellent service and spent a quiet, restful night, free from the noises of a city, excepting the occasional trolley car which passed through the place. The vehicle was run into the scale house and breakfast ordered at 6:30.

Daylight next morning found us sleepy—somehow automobiling produces this effect—so we did not arise till 6, and while wife and the boy were dressing I looked over the wagon, pumped the soft tires, filled the water tank and oil cups and adjusted a slight looseness in a connecting rod. The onlookers discussed the vehicle, as usual, and guessed its weight from 400 to 2,000 pounds, at which the hostler looked wise and winked and finally announced that he had just weighed it at 1,090 pounds. Inquiry as to the distance we had come gave little satisfaction, for the roads were so crooked that no one seemed able to advise us positively, and, in fact, Pennsylvania miles, like the sign boards, are very uncertain. Some distances are given in the time required to drive with an ordinary team instead of in miles, so that they are largely guess work instead of measurement. We decided we had covered about 45 miles over roads which are mostly of dirt and liable to be bad in rainy weather. We left mud behind us at Reading and found another muddy section near the Perkiomen River, but dust near Boyertown and Hatfield.

A DENSE FOG.

Breakfast over, we got away shortly after 7 and started out in a fog so dense that we could scarcely see across the street, which necessitated our inquiring the direction before we had gone two blocks The fog deposited on our hair and clothing in a thick mist, causing the boy to dub me "Santa Claus," while the ghostly appearance of houses, trees and occasional teams looming up in the fog without warning did not encourage rapid driving. Our spectacles could not be used because of the mist, and the strain on our eyes without promised headaches. There was no dust, however, and some fun began to come our way, for as we neared the first schoolhouse we found in the fog, two men filling a water barrel in a one horse wagon. Our sudden appearance frightened the horse, causing him to jump, and we were treated to the spectacle of one man falling out of the wagon backward, spilling the pail of water all over himself, while the other grabbed for the lines. Nothing happened, however, and the fallen man got up laughing, so we continued our way doing likewise.

A little further we heard a commotion in a cornfield about 200 feet from the road, and the fog being lighter, we could make out a horse and wagon racing parallel with us. A dark object arose from the middle of the wagon, but instead of trying to stop the horse, he disappeared over the back end and the horse kept on going. We soon passed a toll gate, where we again inquired the way, and by this time the horse had reached a nearby barn and stopped, with everything apparently in good order, while the man came walking a short distance behind. Three stops were made for teams, requiring probably five minutes, and we reached Chalfont, 5 miles, at 7:30, stopping here for a horse, then went on to Doylestown, 5 miles, where we arrived in twenty-five minutes over roads that were both dusty and sandy.

We were now on the line of the old York post road, so had less trouble regarding direction, and the road became better, although not fine. Two stops for horses and three for toll (22 cents) brought us to New Hope, 10 miles, at 8:45, where we crossed the Delaware River; toll, 17 cents. As we entered the bridge a whistle began blowing, but we did not know the reason until we reached Lambertville on the opposite side, where we met a fire engine drawn and pushed by about fifty people, making slow progress toward New Hope. We were besieged with inquiries as to the fire, but could give no information. A little farther up the street we saw coming another engine, drawn laboriously by a few men, and thought of towing them across the bridge, but before we could put the thought into execution a short whistle announced the fire out, and our opportunity to assist was lost.

The road toward Ringoes leads largely up hill and is mostly a dirt road, but well kept, so we traversed it nicely. We further met two scary teams, for which we stopped, and in each instance were thanked for so doing, which caused us to wonder whether we had reached a community where good manners are in evidence. At Ringoes we took the wrong road, in spite of our inquiry, and not only lost eight minutes to learn this fact, but found ourselves a mile or two out of the way. The farmer who kindly directed us advised us to take the road along the Raritan River to Somerville, because of its picturesqueness, although slightly farther. He wished to educate his horse to the motor vehicle and requested us to wait till he brought him down from the stable, so while waiting we examined and filled the oil cups, but found nothing else needing attention.

The ride along the river was pretty, but very crooked, and the road was so narrow that meeting teams was not pleasant. It brought us, however, through Duke's beautiful farm or park and awakened reflections, not pleasant, as to the comparative profits of the tobacco and automobile business. At Somerville we were told to

e trolley track and began to meet
s of civilization in the shape of
'el roads, free from gutters and
d drifted along merrily to Bound
at 11:13. Here we chose the
oad, of course, continuing straight
stead of turning to the left, and
nd ourselves a mile or two out of
following a road that seemed to
: in a cornfield on the other side
tle swamp. We were so sure we
: through that we disliked to turn
d spent some time trying to find
t, but were obliged to retrace our
o the city to get on the right
loss of 3 or 4 miles and fully
minutes. Once right, we reached
l at 11:55 and stopped for dinner
et looking place, a little beyond
We had evidently gotten into
e of New York prices, however,
aid double price for a meal that a
County housewife would have
:d for.
the motor was looked over and
r tank filled, after which we were
our way toward Elizabeth. With
y lack of acuteness, we chose the
oad, and after a mile or two in-
inding we were headed for Rah-
decided to retrace, losing ten or
minutes. We rolled along over
autiful roads smoothly and rap-
vever, and reached Elizabeth be-
Having once lived here we
and renewed a few acquaintances,
ch we drove down to the port to
ferry for Staten Island. Just be-
:hing the ferry we improved the
nity to fill up with gasoline at a
s establishment, where we used
e fuel in 1897 when motor vehi-
: a curiosity in that territory, the
th then and now being cheap as
d with many other places. The
s on Staten Island to St. George
ckly made and we were soon fer-
ward New York, after which we
› to Chambers street, where we
ok a ferry to Long Island City.
we were told to follow the asphalt
strips to Flushing, and drifted out
de, 12 miles, over a beautiful road
stopping, in three-quarters of an
he next afternoon being Sunday,
the vehicle, and with its load of
: eight drove 50 miles or more
ne of the beautiful Long Island
while on Labor Day we visited
sland in the afternoon and enjoyed
ater bath, driving 50 miles or over
ourse of the afternoon. The large
of the vehicle contributed greatly
pleasure on these occasions, while
:le did not seem to mind the added
cause of the splendid roads. At
Island one driver attempted to
s superiority by passing us, which
nted, and he therefore passed us
ut when last seen he was fully a
e behind and not gaining. A no-
feature of the day's trip was five or six broken down horse vehicles, but no stalled motor vehicles were seen.

Monday morning we had attempted to find the source of the occasional knock by removing a piston, but nothing was found, and the piston was replaced without a change in the results. Tuesday morning we filled the vehicle with eight people and drove to New York, leaving the ladies at the big stores while we attended to some business. At 3:10 we were on the Twenty-third street ferry (25 cents fare) headed for Jersey City and the Hudson County boulevard. We had chosen this because of its oft told beauty, and enjoyed the drive to Bergen Point very much. Some excitement at the ferry on inspection showed to be two automobiles evidently unable to go up the incline. The offending one was roaring with both gears and exhaust, while at the same time emitting a cloud of blue smoke, evidently due to burning lubricating oil. After several trials it backed out of the way, and the other vehicle, a two passenger one, got up the incline, after which a rope was passed down to the large one, and with this assistance it made the ascent. We assured the ticket man that we would not cause him trouble of this kind, and left Bergen Point at 4:20 (fare, 50 cents, which seemed much money for a short ride, as compared with the fares elsewhere).

Twenty minutes after landing found us just in time to catch the Elizabethport ferry, which we left at 4:48. At the first cross street we turned to the left a couple of blocks for gasoline, and left Elizabeth at 5:12. The level roads with some dust offered a splendid opportunity to study the dust problem behind a large vehicle, so I gave daughter the lever and took a seat in the rear. With a raveling from a bit of waste tied to the point of an umbrella I explored the various air currents around and behind the rear of the vehicle, so as to ascertain if possible where the dust came from and what caused it. The result indicated a forward current following the vehicle centrally behind and above the large rear end. The cause of the current toward the vehicle seemed to be the upward direction given the air by the low front end with high middle seat and still higher rear seats, and it would seem possible to stop this dust current by the use of awnings or similar devices set low at the rear, so as to give a downward direction to the air passing over the vehicle. This test being made on a level stretch at a steady speed gave more fully fixed conditions, and therefore more reliable results than any previous tests made by me, and it bore out in part at least the contention that the front of the vehicle should be high, sloping downward and backward on its under side, so as to deflect the air downward instead of upward. Those who seriously wish to abate the dust nuisance will find food for thought in this matter. Tests with stick and thread are easily made.

AN EMPTY OIL CUP.

When near Plainfield the knock, which had been our frequent if not our constant companion, became quite pronounced, so we stopped then and there to see what had brought it about. This was just at quitting time and a crowd of men were pouring out of a factory near by, but regardless of spectators I hunted the trouble and found an empty oil cup with a dry piston. It required but little time, however, to fill this, and all went well again. We reached Bound Brook at 6:45, where we stopped for supper, three-quarters of an hour; thence we drove to Somerville, 4 miles further, twenty minutes, stopping at the County House, where we found clean beds for the night and a very good breakfast.

The next morning the vehicle was filled with water and oil and cleaned up a little while awaiting breakfast. Inquiry here indicated that the road to Easton was hilly, but in tolerably good condition, and we decided to try it, leaving at 7:30. We reached North Branch, 4 miles, in twenty minutes; White House, 5 miles, in eighteen minutes, and shortly after this chose the wrong road and caught up with a light wagon loaded with baskets of tomatoes. We followed this slowly till it turned in a yard, when we inquired as to direction and were advised of our error. By going a little farther, however, we found a cross road back and were soon right again, having lost only about five minutes.

A little later, as we came puffing up a steep hill, a carriage load of ladies were met, who stopped abruptly and began to unload unceremoniously. We stopped and led their horses by, saw them loaded and proceeding safely, when a milk wagon driven by a small boy drove in sight, so we again waited till he had passed before starting. We shortly reached Lebanon, $4\frac{1}{2}$ miles; Ammondale, $2\frac{1}{2}$ miles, and here we chose the wrong road again, heading too far to the north. Our first attempts at inquiry were failures, either because the people could not hear or would not understand, but a mile or so further an intelligent farmer stopped in the field to watch us and we inquired of him. He assured us that we could get there by going ahead, although the distance was perhaps 2 or 3 miles further, but the road not so hilly. We were out to see the country and the motor did not care, so we decided not to go back, but followed his directions through Charlton, Glengardner and Asbury, 14 miles. Here we caught up with a young fellow and his girl in a carriage, so deeply engrossed with each other that they would not understand we wished to pass them. After following along for some time at a jog trot gait, which seems sleepily slow to a motor vehicle man, we proceeded to settle the matter by driving past him in

the ditch on the wrong side, and were not long getting out of his way.

IRATE DRIVER, BUT QUIET HORSE.

We had hardly regained our temper when we found the road obstructed by some repairers, particularly a middle aged man, unloading dirt from a light one horse wagon. He fanned the air frantically with his spade, warning us not to come closer, although the horse seemed to be paying no attention whatever. We crept slowly down, however, and finally stopped and waited for him to either secure or remove his supposedly dangerous horse. Instead of this he began shoveling dirt as if he intended to unload before letting us by. We were not interested in watching road repairs, so again started forward, which brought on another fit of gesticulating. He pointed to the gutter and temporary bridge behind him, warning us to stop, and finally threw down the spade as if he intended to get out and stop us. With visions of a scrap arising before us we crowded alongside and in behind his vehicle, getting across without trouble, while the horse slept on. Here we inquired the road, but evidently displeased at our ignoring their authority no one in the crowd knew, so we turned to the right and kept going.

In this locality we climbed a small mountain and wondered what the other road would be like if this one was "the best" as to hills. Going up this the motor seemed distressed, and we stopped at the top to fill the oil cups and enjoy the magnificent view over the valley to our right. We reached Bloomsburg at 10:40, Phillipsburg at 11:10, and found paved streets carrying us into Easton five minutes later. Passing through Easton we climbed a hill, met an auto, and headed toward Bethlehem, where we stopped three-quarters of an hour for dinner.

A MOTOR CURIOSITY SHOP.

The road from Bethlehem to Allentown is a toll road (10 cents for 5 miles) and the best we had found since leaving Bound Brook. Two stops to avoid scaring a horse led behind a buggy, and 10 cents toll across the bridge brought us into Allentown, having covered 5 miles in eighteen minutes. Here we turned off the main street half a block to reach Nadig Brothers' machine shop, intending to get acquainted with those pioneers in the motor vehicle business and fill up with water. They were surprised at our getting into their yard without making enough noise for them to hear and were pleased to furnish all the water required, together with the labor of putting it in, as well as to show their museum of curiosities. This latter includes one of Pennington's much exploited mile a minute war tricycles, and, of more value and interest, the motor vehicle constructed by themselves in 1893, a very creditable piece of work and one that saw considerable usage. After a pleasant half hour we bade them farewell, turned the crank and took our seats, following which the motor stopped dead in a mysterious manner. Thinking I had shifted a switch (for this vehicle was wired for batteries), I dismounted and cranked, again with no result. With more or less embarrassment the gasoline adjustment was changed, the magneto shaft examined, the wiring looked over, cranking between each move, while the weather seemed to grow inexpressively hot and perspiration flowed freely. Everything proved ineffectual, however, and there was nothing left but to inspect the insulations; so one insulated plug was detached and the engine started immediately with the other two, showing the trouble to be a faulty insulation on one engine, due, evidently, to the excessive amount of oil fed on the trip. To make the best of a bad job, attention was called to the ease with which this insulation could be cleaned and a couple of minutes more found us going again as if nothing had happened.

With their explicit directions so kindly given us we had no difficulty finding the right way out of town, and were soon drifting along over a rocky Pennsylvania road at about 12 miles per hour through Downeysville, Trexlerville, Manxatawney and Monterey toward Kutztown. We stopped at once to fill the oil cups, and two or three times to inquire the way, getting off the roads five minutes or more at one place, arriving at Kutztown, 18 miles, in an hour and forty minutes. Here we stopped to talk for a few minutes with a friend and then passed on toward Reading, through Amityville, over macadamized roads which permitted high speeds. We were so near home that we did not mind crowding the vehicle and made the 18 miles in a little over an hour, although we took the wrong road once and were obliged to stop two or three times for horses, reaching home at half past 4.

NEW PISTON RINGS.

We had covered about 400 miles since leaving, had driven to and from Elizabeth (which is practically New York, for there are but a few miles on Staten Island) without taking gasoline on the road; had done absolutely no work on the vehicle except cleaned one insulation, pumped the tires, which were soft when we started, adjusted a connecting rod and filled two of the three oil cups frequently. We had scared a number of horses, but this is explained not by the appearance or noise of the vehicle, but by the fact that our roads were not frequented by automobiles, and therefore horses were not accustomed to them. In fact, the only motor vehicle seen on the return trip after leaving Plainfield was at Easton, excepting, of course, those in the shop at Allentown. We demonstrated conclusively that something was wrong in two of the three cylinders of our motor, as shown by the fact that the centre oil cup properly lubricated its cylinder, although feeding but one-eighth to one-tenth as [illegible] -r two. We conclud[illegible] trouble must be in the piston rings, and that [illegible] the quality of the iron was p[illegible] sponsible for the changed re[illegible] rings. New rings of different [illegible] therefore made and the vehicl[illegible] for a test, as rapid as our roads [illegible]mit and harder than any give[illegible] trip described, with the result [illegible] tress was found. Ordinarily th[illegible] ferred to would disappear after [illegible] use, and this fact prevented ou[illegible] long enough to find it.

To anyone contemplating t[illegible] may say that there are more r[illegible] mile between here and Somer[illegible] way of Easton than on any [illegible] which we are acquainted. The [illegible] builders evidently threw every [illegible] could find from the size of [illegible] downward into the road, and th[illegible] in place, unbroken but partly o[illegible] the dust and sand over them. [illegible] try along the route, however, i[illegible] teresting, and if one has busine[illegible] and is not in a hurry the trip m[illegible] taken. We drove from Readin[illegible] beth in eight and one-quarter [illegible] way of Doylestown and Lamb[illegible] turning in nine hours by way [illegible] and Allentown, and regard this [illegible] able for an eight passenger ve[illegible] ing a family of five on the retur[illegible] consideration being given to t[illegible] of the passengers and the safet[illegible] users of the road.

CHARLES E. [illegible]

...COMMUNICATION[illegible]

Difficulty in Replacing [illegible] Spokes.

Editor HORSELESS AGE:

As I think it is the duty of a [illegible] warn the public against practices [illegible] manifestly wrong, I take the [illegible] writing you these few lines. [illegible] users have complained in the pas[illegible] the columns of THE HORSELESS [illegible] Wheels and Tires), of the lack [illegible] sion for inserting new spokes on [illegible] side of the driving wheels of [illegible] steam carriages, but one finds [illegible] in the latest models this inconve[illegible] not been remedied.

When I started for Boston t[illegible] end of the first part of the A. [illegible] liability Run, I did not take [illegible] spokes with me, because I knew [illegible] should break some spokes it [illegible] most assuredly on the inner si[illegible] driving wheels, and in this case [illegible] possible to insert new spokes on [illegible]

When I reached Boston, aft[illegible] pleasant trip, I found that I [illegible] broken spokes on the right driv[illegible] and two on the left one, all on [illegible] of course. At the automobil[illegible]

put up they did not have any
ɔ fit my carriage, nor the tools to
the wheels. Then I went to the
ffice the manufacturers of my car-
re in Boston, and to my utter dis-
as told that they had not a single
the establishment, although there
air shop connected with it. The
g I could do was to use a vise and
and make a hook at the broken
he spoke and insert it as best I

ıay well be a little shaky to under-
undred mile run with repairs of
re. Nevertheless, I reached home
y one broken spoke (always on the
ɪ the driving wheels), but it was
of the repaired ones. I still use
age as it is, for the roads are now
: shape than at any time in the
: I intend to renew all the spokes
inner side of the driving wheels
e cold weather sets in; as for the
t is always time to renew them
ey break.
in Boston I had occasion to talk
e of the most brilliant inventors
ufacturers of steam carriages, one
proves or alters his carriages al-
ery month. I propounded the dif-
ɔ him. He told me that he had
that would never break. I had
to do but to accept this bold state-

ERNEST DUVAL, M.D.

---

nds the Steam Carriage.

IORSELESS AGE:

ou permit me, through your col-
› take upon myself the somewhat
s task of defending the steam car-
e despised steamer derided by the
of gilt edged, morocco bound ton-

ıat I would seek to turn the ton-
ner from his toy; far from it. For
ıo want that sort of thing, that sort
g is just what they want. Gentle-
o desire to cut a swathe, both fig-
and literally, can do no better
purchase a touring car. And for
ıe bigger and brassier and noisier
he better.
o the other class of automobilists
ish to point out the merits of the
arriage, those who wish to own
s which will run, not swiftly, but
that may be operated with ease;
be kept in repair without the ser-
a chauffeur. And I write also to
dreds, perhaps thousands of peo-
really desirous of owning automo-
: deterred from purchasing through
servations of the antics of the gas-
d cheap steam machines.
team carriage has never had a fair
n the early days of the automobile
in this country, a concern turned
hundreds a cheap steamer which
some $700. These carriages were
tly built, and were faulty in design and workmanship. They were, in fact, veritable toys, suitable only to run in circles on the parlor floor. But they were cheap and the demand for them on the part of a guileless public was so great that other concerns hustled to get in line and turn out carriages closely copied after the models of the older company.

It was the sale of these carriages that killed the goose that some day might have laid golden eggs. The public bought, tried to use and then threw away their cheap steamers, and, in disgust, turned to gasoline machines.

The manufacturers of gasoline carriages, profiting by their observations of the faults of the steam machines, began to turn out carriages of better workmanship than the steam carriages. Additional weight and better workmanship were put into the carriages, substantial running gear and steering apparatus were used. In short, even in the earlier gasoline wagons, irrespective of the merits of the two motive powers, we find plenty of evidence of their mechanical superiority over the cheap steamers.

Is it to be wondered at that these gasoline machines of greater weight, of far better workmanship and design and of greater price, have given better satisfaction than the cheap steam carriages? And is it fair to compare the performances of the one with the other?

It has been my fortune to be placed in a position to make a fairer comparison. For four years I have owned a steam carriage, the original price of which was close to $2,000. It is not an ordinary cheap steamer sold me at a double price because of the addition of a leather boot, an outfit of tools, a water bucket and a dinky seat perched on the dasher. The carriage was built on honor, and I have the opinions of more than one machinist that it exhibits throughout far better workmanship than any other steam carriage. Even when I bought the carriage, four years ago, the manufacturers included in the purchase price many little things which even today are classified as "extra attachments" by the makers of steam carriages. No portable torch was required, nor was it necessary for the operator to carry a jug of alcohol along with which to start his fire. A stationary torch, burning gasoline, admitted to it by simply turning a cock, saved me all the trouble. My carriage had, when I bought it, both a cross head water pump and an air pump as well. An injector—a good one, too—was part of the equipment. The engine is compound, with a device whereby live steam can be thrown into the large cylinder when necessary for hill climbing or on sandy roads. The fire is controlled automatically. The burner is not of the light back variety. The boiler holds more than a quart. The engine is entirely encased, not by a rubber blanket, but by tight fitting metal covers.

This carriage I still have, after some 4,000 or 5,000 miles of service over rough and hilly New England roads. I have driven it once from Massachusetts to Delaware and return, once from Washington, D. C., to Massachusetts, and on several occasions I have taken shorter trips in Massachusetts, Rhode Island and New Hampshire.

I have also owned a gasoline touring car made by one of the leading concerns, and for two years I had the opportunity to compare the workings of steam and gasoline. During one season I ran the gasoline car myself; the second year I employed a chauffeur.

The result of my comparison is briefly shown when I state that a month ago I sold my touring car, but still retain my steamer.

I believe that for a touring car a chauffeur is a necessity; for a smaller gasoline carriage a chauffeur is, if not a necessity, at least almost a necessity. With a steam carriage I have never felt the need of such assistance.

The constant cleaning of spark plugs, of cylinders and carburetors and the many adjustments that frequently need taking up, which experience makes me associate unpleasantly with gasoline cars, are almost wholly wanting on steamers.

"There is nothing to watch on our carriages," say the gasoline men. Possibly not, but there are plenty of things to hunt for. A cylinder is missing; which one is it? The battery is weak, although it was new only yesterday; all hunt for the short circuit. The engine doesn't seem to get any gasoline; there must be dirt in the carburetor. Pull it apart and we will clean it. No dirt? Do you hear that grating noise? Yes, we hear that grating noise. That is a clutch that makes that noise. Grate, clutch, grate.

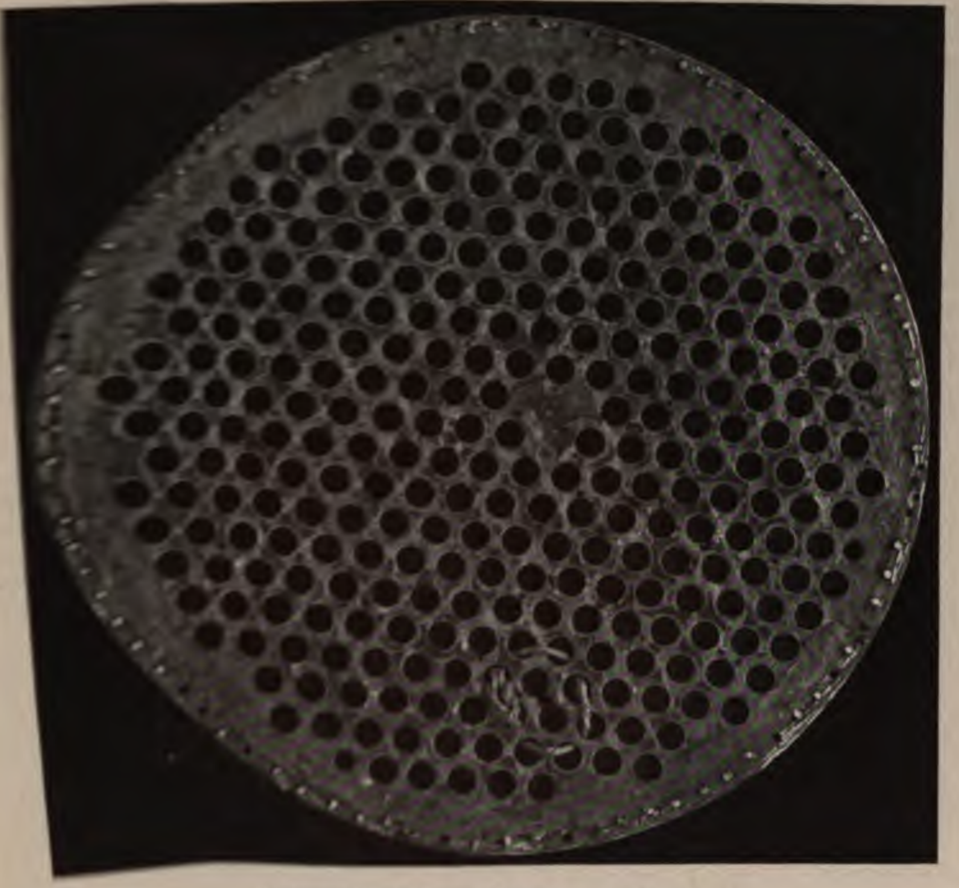
And so on through the primer. Why is the attention of automobile manufacturers riveted on the gasoline car? The gasoline engine is acknowledgedly cranky. Even a stationary gasoline engine is far from ideal. Why is the steam engine cast aside? The steam carriage runs smoothly and silently, there are no mysteries about it. Some day, when the present craze for speed abates, a return may be made to steam.

G.

A Tube Sheet Destroyed by Corrosion—How the Boiler Was Repaired.

Editor HORSELESS AGE:

I am sending you by express the bottom tube sheet of my automobile boiler. The circumstances which lead me to take this step are that I have felt some curiosity for a number of months as to how long the boiler would last, and I have always felt a certain unpleasant feeling that some day a piece of it would blow out. As I was the builder of the boiler myself, I naturally had some misgivings, as a home made job is rarely as satisfactory as a first class, bought article. Of course, I was aware that the workmanship and material



BOTTOM TUBE SHEET DESTROYED BY CORROSION.

were of the best, but, nevertheless, always felt a little nervous about it.

This boiler was of the regular locomobile type and size, and has driven a carriage weighing approximately 550 pounds fully 7,500 miles over the road, and though I have never figured the cost of running I have been most thoroughly satisfied with this type of automobile, and, having been a constant reader of THE HORSELESS AGE, have noted that I am not alone in my ideas in this regard. I entirely agree with the gentleman who wrote in the issue of October [illegible], under the heading of "A Year's Experience With a Steam Carriage." My [illegible] repair bills, of course, are much less than any that I see listed in any of the [illegible] of this nature, as I do all my own [illegible] work, and outside of the cost of [illegible] for driving machinery and [illegible] material used I do not figure [illegible] time being valued at nothing [illegible] which I would otherwise [illegible] form of amusement.

[illegible] could be made of [illegible] which I send you and in- [illegible] of the circum- [illegible] decided relief [illegible] readers of your paper [illegible] the matter, must [illegible] such an event is [illegible] It appears to [illegible] taken [illegible] to the [illegible] that [illegible] the

laminations, if there were any, were somewhat drawn apart, permitting the corrosion to work through the body of the sheets between the tube holes, which it would not have done if the sheet had been drilled out of the solid. However, I feel convinced that the actual mischief was due to use of rain water collected on the roof of a large, newly shingled barn in East Gloucester, where my machine was kept during the summer of 1901, as I noticed that my exhaust came almost blood red the first time after I blew my boiler down after using this water, and it has been more or less this way ever since. The opinions of various boiler men on the subject differ so widely that apparently they are of little practical use. The fact remains, however, that it has become necessary for me to rebuild the boiler in order to get any further use out of it, and this I have undertaken in the following manner: Having made a counterbore which would cut the flanged heads of the tubes just flush with the tube sheet, I ran it down on both ends of the boiler, cutting all the tube heads off, and after having cut the rivets, as will be seen by the plate which I send, I drove the lower head off, leaving the tubes sticking into the upper head. I then removed the tubes and scoured them to remove the rust and what little scale there was, and sent the shell to a coppersmith to have the bottom flange cut off and new flange turned out. This [illegible] a couple of dollars, and the [illegible] tube sheet is, as is

known, $1. The lab[illegible] only estimate by my[illegible] in tubing up boilers, [illegible] will probably take se[illegible] outside of the small e[illegible] the trouble and delay [illegible] inclined to believe t[illegible] not prove very detri[illegible] power of the carriag[illegible] shortened but 11-16th[illegible] and though the heatin[illegible] be reduced a small pe[illegible] that I have always h[illegible] spare owing to the lig[illegible] that I have never kn[illegible] had to wait for stea[illegible] been able to make ve[illegible] hills as Corey Hill, a[illegible] which I noticed nearl[illegible] large gasoline machin[illegible] Test in the vicinity of[illegible]

The Reliability R[illegible] rectio[illegible]

Editor HORSELESS AG[illegible]

I see in your last [illegible] bring to book one o[illegible] including B 45 amon[illegible] recent Reliability Run[illegible] esting to have him exp[illegible] bunch of six alleged [illegible] motors" he included B[illegible] which are steamers! [illegible] another report, in the [illegible] ber 15, on page 420, it [illegible] stopped and cranking [illegible] the list in the same is[illegible] in A class at all, but [illegible] steamer at that!

[Both statements ar[illegible] and we are obliged t[illegible] for pointing them ou[illegible] of the last mentione[illegible] number being fastened [illegible] and the latter turned u[illegible] vehicle the number wa[illegible] It may be stated in [illegible] some vehicles carried t[illegible] front and one in the re[illegible] ried only one, and the [illegible] attached in such mann[illegible] removed when repairs [illegible] certain parts. It is ou[illegible] urged, that two plates [illegible] one to be carried at t[illegible] the front of the vehicl[illegible]

A Carriage Bui[illegible]

Editor HORSELESS AGE[illegible]

Will you grant spac[illegible] journal for a few wor[illegible] builder? From the ve[illegible] automobile movement [illegible] have been intensely in[illegible] cause I have been a lif[illegible] hicles and partly beca[illegible] neer, machinist, model[illegible] will—before connecting [illegible] riage building. Now [illegible]

all along surprised me very much, is that the carriage builder's meth- : been entirely ignored when it the construction of the self pro- hicle. "Why is it," I have often 'self. "that materials and methods uction which have stood the test dred years are entirely left out of by those who have taken to this ıstry?" The carriage builder has ıt the very best frame for his ve- ›ne built up of good tough wood ith iron or steel, and that no other ion will stand successfully the se- ins to which vehicles are subject- ; frame he has found to be good it is easily constructed, easily re- ; sufficiently stiff for his purpose, e same time is possessed of ample ;s and elasticity. Can we say the the steel tube construction now in vith most automobile builders? not. The steel tube frame is ıting in flexibility, and when it goes "all at once," like the "Dea- e Hoss Shay." When it comes to I write feelingly and from experi- liver me from the brazed joint ;ear. I feel sure a goodly army 's will say "amen," if not "Good liver us." at this point.

ust a word more as to the re- nerits of steam and gasoline vehi- m now. and always have been, an oi steam. I think there is no on between the noisy gasoline car :onsumptive cough and the steam hat glides along almost noiseless- perhaps unfortunate that the first .rriages were so faulty in design all subsequent builders have (like oi sheep) followed their leader, result that the usual type turned is a short, high hung affair look- ın open buggy with the horse left re is no question in my mind that ow hung steam carriage with am- ng capacity and luggage room, half springs, using a good sensi- iage axle, wooden wheels, con- asy to get at engine, etc., would boon to many who, like myself, team to be the power, but who n unable to find such a vehicle designed and built.

t work upon an experimental ma- ich differs radically from the usual oi design and construction, but ll. I believe, appeal to those who steam carriage for touring pur- d who will appreciate the fact that er did not entirely forget that peo- "tour" like ample room for lug- :.

AUTOMOBILE CARRIAGE BUILDER.

;plosive Engine Queries.

:ORSELESS AGE:

are the bore and stroke of a De ›tor of 8 horse power?

how large are the valves?

How large and what weight are the fly-wheels?

What weight and diameter should an outside flywheel be for two cylinders of that size? A. K.

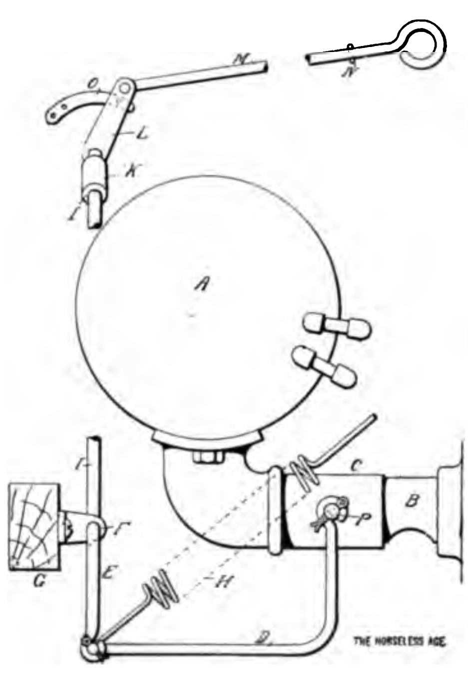
[The bore is 100 and the stroke 110 millimetres, or the cylinder is about 4x4¼ inches. The two valves have an effective diameter of about 1¼ inches each. The internal flywheels are a little over 10 inches in diameter. For a two cylinder 4x4¼ inch engine in which the explosions occur at equal intervals we would recommend an outside flywheel about 15 inches in diameter, weighing 60 to 70 pounds.—ED.]

A Muffler Cutoff for Oldsmobiles.

COLORADO SPRINGS, Col., November 1.

Editor HORSELESS AGE:

In reply to a query in a recent issue of your paper, relative to the efficiency of a muffler release for the Oldsmobile, the writer would say that he has equipped a half dozen of these machines with an original device for this purpose, and that for simplicity and efficiency it surpasses any of the many schemes devised to accomplish the same object which have come under his notice. The only possible objection, if such it may be called, to this device, would arise from the fact that when release is closed there is a very slight hissing sound, hardly perceptible, from around the joint. There are several means of stopping this, but the added labor and complication would seem hardly to warrant their use. The cutout, as explained and illustrated below, adds to the hill climbing power of the vehicle and to its speed upon the level, and it reduces the heating up of the motor and the cooling water when upon the low gear. The following sketch explains it quite clearly. In turning down the pipe B it must not be a working fit in the steel



tube C, for in that case it would immediately get to cutting from the high temperature of these parts. It should be made a fairly loose sliding fit.

The pin P in C is shouldered and made a drive fit into a 7-32 inch hole in C and riveted upon the inside and then filed smooth. W. O. ANTHONY.

[On the drawing A is the muffler; B the exhaust pipe leading from the engine to the muffler, in which a ⅞ inch hole is drilled, as indicated on the lower side. C is a short length of bicycle tube sliding over the exhaust pipe; D is a bent ¼ inch iron rod, which at one end has pivoted to it the bicycle tube C, and at the other end has a pivot joint with the lever arm E. The latter is also a ¼ inch iron rod, and is formed by the nearly horizontally fore and aft extending rod I I bent approximately at right angles. The rod I I has a bearing F at the rear end which is screwed to the side sill G of the body, and another bearing K at the front end, which is located in the front board of the seat. The forward end of the rod is squared and has fastened to it just forward of the front board a lever arm L. From the outer end of this lever arm extends a ¼ inch iron rod M parallel with the front board rising toward the right hand side of the seat. The rod is guided by a staple N. The sleeve over the exhaust pipe is normally held over the opening in that pipe by the light coiled spring H. By pulling on the rod M the sleeve can be withdrawn from over this opening, as shown in the drawing, and the mechanism can then be held in position against the tension of spring H by means of the brass spring latch O.—ED.]

Automobile Legislation in Vermont.

SPRINGFIELD, Vt., November 10.

Editor HORSELESS AGE:

I read with especial interest your last issue regarding automobile legislation—perhaps the more so because we are for the first time having a little taste of it in our old State of Vermont. I enclose the bill, H. 16, which was rushed through the House before most of us automobile owners knew what was up, but a week ago a number of us met the Senate committee, with what result I do not know, although I enclose a clipping from a St. Albans paper which states that the bill was killed by the Senate. I think this is not so, as I do not believe it has yet come before the Senate. We asked for an amendment to the bill, making it 10 and 20 miles instead of 6 and 12, and hope to get a compromise, at least.

I was somewhat surprised to notice in your reference to Vermont's attitude that Springfield was classed among the towns which have a strong anti-automobile feeling. I, of course, do not know where your information came from, but would take exception to it. There are only three machines in this place, two of which I

own and operate, and while there might have been such a feeling a year or two ago I think it has largely disappeared. If it still exists, I suppose I am responsible for it. I have tried to use all the care possible, even to giving them the whole road, leading by teams, etc. The only accident that has occurred to me this season was when an excited individual got out of his wagon and tried to catch his horse by the head. The horse seemed to be more afraid of him than he was of my machine, and backed the wagon deliberately into me, and as my machine offered an effective barrier, he crushed his rear wheel, which I settled for rather than have any bad blood.

I think a careful investigation would show that the most intense feeling of opposition that exists in this State is in the towns and districts where no automobiles are owned, and is fostered by newspaper and verbal exaggerations. It was brought out at the hearing that the local automobilists seemed to be reasonable beings, but the parties touring were the ones that did much to excite the opposition of horse drivers. I think that as soon as there are more machines in the State and another generation of horses, this matter will take care of itself. Yours truly, W. D. Woolson.

[The information which we published came from town and county clerks, the most authentic source we could avail ourselves of. In some cases it may have been colored by prejudice, but this is true of every official canvass. The bill referred to was introduced by Mr. Horton, of Poultney, and limits speed in cities and the thickly settled parts of towns to 6 miles an hour, and in outside districts to 12 miles an hour. The usual clause demanding reasonable precautions when meeting horses is introduced and a reduction of speed at crossings to what is "reasonable and proper" is required. The punishment for each offense is a fine not exceeding $100 or imprisonment for a term not exceeding fifteen days, or both.

The town clerk of Springfield, Vt., replied to our question whether there was any anti-automobile feeling in his section in the affirmative, but added as follows:

"The men who own automobiles in this town are as considerate as anyone could be when meeting teams. Strangers going through do not always take pains to avoid trouble or seem to care."—Ed.]

Repairs.

Editor Horseless Age:

After reading two or three articles lately in The Horseless Age and replies to them regarding the items of cost and repairs of automobiles, I cannot help saying a few words to express my views on this all important part of the subject. In looking over the contribution of Dr. George P. Jessup I observe his batteries cost him nearly as much as his gasoline, but the battery mileage is only given as 15,000 while the cost of gasoline is quoted for 18,000, thus favoring the battery repairs.

In 1900 I operated a standard gasoline carriage for many hundreds of miles. I never kept a continuously accurate account of the distance traveled, excepting for the purpose of determining battery mileage. I used from 10 to 15 gallons of gasoline per week, with an average of about 10 gallons, which cost me at that time 10 cents per gallon in 10 gallon lots. While operating at this rate I used a set of Columbia dry cells every four or five weeks, costing me $4.50 per set, which seems to be about the average price at the present time.

Dr. Longaker, in his article on the "Item of Cost," quotes battery cost a little lower and somewhat under the cost for gasoline, so I conclude he must have had greater mileage per set of cells than I did. I learn from a number of operators that the gasoline and battery cost are about equal. This is not as it should be, and, knowing this, the agent goes on and tells about the low gasoline consumption and says nothing whatever about the cost of batteries. At least that was the way they treated me. I wrote to the makers of the battery stating my trouble and they informed me I should get 1,000 miles from each set of cells, whereas I never obtained that number, mostly not over 500 miles before the engine would miss fire, even on short runs, and a new set was required.

I am now using a gasoline carriage which is fired by a magneto and as yet has given no trouble whatever, and it certainly is a satisfaction not to have to wonder whether your battery will hold out or not. I don't even own a battery, excepting some exhausted cells which will not even ring a doorbell, and I start without difficulty.

At the factory I observed that the workmen invariably start the motor by simply pushing the crank past the compression by means of the foot, not using their hands at all. I am perfectly aware that my experience with this particular carriage is too brief to be of great value, but I cannot help thinking that my troubles from exhausted cells, bad connections and short circuits are at an end, for one wire being grounded on the motor and the coil being placed in close approximation to the magneto, I virtually have but one wire to look after. Therefore I cannot see the use of fitting carriages with batteries, vibrators, tremblers, extra wires and all the other parts of a delicate system of ignition, be it jump spark, wire spark or make and break, when a 12 pound magneto and one wire will do the work, and give fat, blue spark and current to spare. My magneto fires when run as low as 200 revolutions per minute, and ranges from this up to 800 or 1,000 revolutions, and never seems to fail be the speed of the engine what it may, al- [illegible] with the three cylinders capable of a speed of 1,500 revolutions per minute, so I formed.

Regarding tire expenses, I wish I operated a carriage of 1,800 weight for eight months at a cost for tire repairs alone, and at the that time a new rear tire was price $61, making a total of $94 f eight months' use, a very expen rangement.

Later I operated a carriage of a pounds weight over a longer period and covering the same time of the total of seventeen months, and cost me $1.75, and at the end of thi all the tires were holding air from six weeks; good argument in favo medium weight carriage. All of th were of the single tube variety. I using clincher tires, and I never anxiety in starting out, for a road pair is a simple matter. In the ol days I used several kinds of t finally adopted the clincher, and h timed at the roadside making a one minute ten seconds by the w cluding pumping up.

W. P. Haines.

Eagle Rock Hill Climbing C

The Automobile Club of New will hold its annual hill climbing on Thanksgiving Day on Eagle R near Orange, N. J. The hill is sa about a mile long and to have in 14 to 17 per cent. Steam and gaso chines will compete in separate clas tries can be made until shortly be date of the contest with W. J. secretary, Automobile Club of N sey, 8 Central avenue, Newark, N

A Correction.

In a recent issue of this paper was printed of a Winton touring c on the top of Foster Hill and "Alone and in Trouble." Appare car was in trouble, but such was case. The car contained a party ton and New York newspaper men car was stopped by Mr. Harry New England manager for the Company (who had the party in in order that the newspaper repres could go to the foot of the hill and the hill climbing performances of testants in the New York and Bos durance Run. In justice to Mr. and the Winton we wish to make rection.

The John S. Leggett Manuf Company has been formed at S N. Y., to manufacture automobi motor cycles. The capitalization 000. The directors are John S. Forest G. Weeks, William A. V and Charles W. Tooke, of Syrac Edward R. Redhead, of Fulton. T gett Carriage Factory will be equi a plant.

...OUR...
GN EXCHANGES

Metallurgy and Automobilism.

ticle in *La Locomotion Automo-* m Guillet, who is connected with e prominent French automobile rers, deplores that automobile rers have not availed themselves etallurgical progress which has e in recent years in connection ary and railroad construction. ue descriptions one often meets sion "special" steel. One should guard against this rather pomp-, which frequently designates aving but one particularity, that f a bad quality. This same term, is applied to steels in which are ed proportions (sometimes very metals which until a few years laboratory curiosities. Thus e steel, silicon steel, nickel steel, eel and tungsten steel have been and the series is being added to sly.

igner now has the choice of a e of materials and may find a satisfying every requirement of ength, elongation, hardness and its.

examples will illustrate: In the xtra soft nickel steels (i. e., those little carbon) there is a great metals of different qualities, from vith 2.5 per cent. of nickel, which eaking strength of from 61,000 64,000 pounds per square inch astic limit of from 47,000 pounds pounds per square inch, to the itaining 15 per cent. of nickel, ter having been properly hard- the enormous breaking strength pounds per square inch and it of 167,000 pounds.

steel possesses extraordinary of hardness and chrome nickel arkable properties in regard to elongation and elastic limit. It at these steels are sometimes deli- n being worked and particularly to heat treatment, but the work- t acquire the necessary skill, and of these metals will become im- n automobile construction.

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w a Dry Cell Is Made

lowing directions for making a dry n from *La Locomotion Automo-* y be of interest to some of our

e a rectangular block of wood 5x3 es, well planed. Wrap this block heet of zinc cut to 10 inches by 6 y bending it close around the corners with a hammer and letting it project over the end of the block at one end. The sheet of zinc should be so applied that the two edges meet in the middle of one of the large faces of the block. These edges are soldered together. The part of the rectangular box extending beyond the wood block is then cut at the edges and the faces are bent over and soldered. This completes the zinc cell.

Now remove the wood block and fill the cell with a concentrated solution of soda, which should remain therein for about an hour. During this time other cells may be made. Then pour out the soda solution and wash with water.

On the bottom of the cell place a layer about one-half inch thick of a mixture composed of 85 parts by weight of plaster of paris and 15 parts of flour. Upon this layer place a rectangular block of wood 5x2x1 inches, well in the centre of the cell. This wood block is provided with a hook screwed into the upper side, by which it may be withdrawn.

With the mixture described and a liquid composed of 85 parts of concentrated sal ammoniac solution and 15 parts of concentrated chloride of zinc solution make a paste equal in volume to about 20 cubic inches, and with this paste fill in the space in the zinc cell around the wood block up to within five-eighths of an inch of the upper edge. When this paste has solidified the wood block is withdrawn, and in the space left is introduced a layer one-half inch thick of a mixture composed of:

	Per Cent. by Weight.
Peroxide of manganese........	60
Powdered gas carbon..........	25
Zinc chloride..................	5
Sal ammoniac (powder).......	10

Upon this layer place a carbon plate measuring about 4x1.2x¼ inch, after having fitted a binding screw to the top end thereof. The carbon plate is located well in the centre of the cell, and the surrounding free space is then filled with a thick paste composed of the last named mixture and water to about one-eighth inch above the edge of the outer mixture. The zinc cell is filled with cork chips to within one quarter inch of the edge, and two small glass tubes one-half inch long and of one-eighth inch bore are forced through the cork, so as to project about one-eighth inch above the edge of the cell. Cover the whole, with the exception of the glass tubes, with a layer of paper, and over this pour melted sealing wax until nothing projects except the carbon plate and the glass tubes.

A brass binding post soldered to the zinc vessel completes the cell, which may be enclosed and submerged in glue contained in a cardboard box serving as insulator. A cell of this shape is very convenient, as there is no waste of space when arranged in a battery. The electromotive force is 1.45 volts.

Prince Henry Automobile Touring.

As already reported in these columns, Prince Henry of Prussia, at the recent automobile show in Hamburg, bought a steam carriage of American make and forthwith went on an extended tour, on which, like most beginners, he met with some unusual experiences, but nevertheless thoroughly enjoyed himself, we are told. He traveled incognito and was recognized by only a few of those with whom he had to deal during the trip.

In Verden he went to a store and bought 42 pounds of gasoline; he told the storekeeper that he had come from Hamburg and had covered 50 miles the day before. The storekeeper was much pleased with the trade and offered his customer a cigar, which was accepted. In Helzendorf, near Bücken, the Prince stopped about an hour in front of an inn, the water supply requiring renewal, about twenty bucketfuls being needed, according to the count of the natives. After having carried a few bucketfuls himself he dropped into a conversation in Low German with the wife of the innkeeper.

Between Wahn and Troisdorf something happened and the vehicle stalled. The Prince sent his companion to a machine shop in Siegburg, a town about 4 miles from where the accident happened, and went himself to engage a man with a horse to tow him to that place. The horse driver stopped on the way at several saloons and went in for refreshments and to give his horse a rest. The Prince, who was sitting in the automobile, remained "out in the cold" during these rests, which is said to have amused him considerably.

After the vehicle had arrived at the shop it was found that the boiler was burned out. Repairs were begun at once, the work being continued all night, and by noon the next day the vehicle was in running condition again. The Prince preferred not to go to a hotel, and he and his companion stopped over night with the owner of the machine shop. The destination of the tourists was Bingen on the Rhine.

Record Regulations in France.

As a result of the faulty timing in the late Deauville track races and discussions arising out of other attempts to lower the short distance records the Automobile Club of France has decided that hereafter all records for the mile and kilometre, to be officially recognized, must be made upon a road between Dourdon and St. Arnould, which is perfectly level and straight. To insure more perfect timekeeping it has been decided that an improved form of the Mors electric timing system shall hereafter be used exclusively.

The Association Générale Automobile has contributed 500 francs toward the experiments with oil sprinkling now being carried on in France.

An automobile show is to be held in the Idrotts Park, Stockholm, next year.

In September the imports of automobiles into British ports amounted to $462,715 and the exports to $63,910.

The Amsterdam Fire Brigade have decided to purchase a new electric motor fire engine, which will be capable of carrying nine men.

At the last meeting of the committee of the A. C. G. B. and I. 140 new members were added to the list, which raises the total membership to close up to 2,050.

Benz & Co., of Mannheim, Germany, during the last business year earned a total profit of $49,725 and declared a dividend of 4 per cent., compared to 8 per cent. the previous year.

The publishers of the *Autocar* have made an offer of £100 for the invention of a carburetor which shall permit the use of kerosene as fuel on present gasoline vehicles. The conditions are not yet published.

The Liverpool Self Propelled Traffic Association proposes to hold another trial of heavy vehicles within a year from the passage of the automobile bill now before Parliament, which is to remove the present restrictions upon the weight of motor wagons.

The spaces at the coming Paris Exposition were allotted by lot on October 27. The following firms secured spaces in the centre of the building: Darracq, Dietrich, Decauville, Rochet-Schneider, Panhard-Levassor, Serpollet, Peugeot and De Dion-Bouton.

The 1903 Darracq light carriage will have a 12 horse power motor, with a governor acting on the admission. Three speeds forward and a reverse motion, all controlled by a single lever, will be available, while a number of minor improvements are also being introduced.

The A. C. F. has nominated the cars which will represent it in the coming Gordon Bennett Cup Race. Panhard & Levassor will run two racing cars and the Mors firm one, both building a like number of cars for reserve vehicles for the event. The nomination of drivers for the cars is left to each firm respectively.

The English railways refuse to carry gasoline unless the consignor signs an agreement that he will indemnify the railroad company against all claims for injury to person or property arising directly or indirectly from the inflammable qualities of such goods. The Anglo-American Oil Company and Carless, Capel & Leonard, the two principal dealers in gasoline, have refused to sign this clause, which was to go into effect on October 20, and a gasoline famine in the inland towns may be looked for.

The program of the "Nice week" of festivities in 1903 has just been published. On Sunday, March 29, there will be a flower carnival; on March 30 and 31 and April 1, automobile races; on April 2, the Nice-La Turbie hill climbing race; on April 3 and 4, an automobile show, and on April 5, the mile race on the Boulevard des Anglais.

It is announced that in the future the French Government will place automobile racing under strict control. No permits will be issued any more to journals or organs, and clubs can only secure permits under the condition that officials nominated by the Government shall be allowed to assist the club officials in the conduct of the events. The results will be communicated to the whole press simultaneously, etc.

An American correspondent of the *Autocar* has figured out that in the English reliability trials the average number of marks lost was as follows: French cars (twelve), 30 marks each; British cars (eighteen), 100 marks each; American cars (six), 43 marks each. The hill climbs figure out as follows: Up the River Hill the American cars went at the rate of 12.32 miles per hour, the French cars 11.47 miles per hour, and the English cars 8.58 miles. The rates on the Westerham Hill were: American cars, 9.02; French, 8.45, and British, 6.88.

Paris-Madrid is to be the French Club big automobile event for 1903, the month selected tentatively being May next. The distance will probably be about 1,400 kilometres, one of several routes suggested embracing Tours, Angoulême, Bordeaux, Bayonne, Biarritz, Tolosa, Vittoria, Burgos, Castillego, Cavanillas and Madrid. As usual, the event will be a speed contest, the roads over the Pyrenees being, however, neutralized, as it is considered that this portion of the run is too hilly and dangerous to warrant racing being recognized.

In the discussion of Captain Longridge's paper before the Institute of Mechanical Engineers, Geo. Iden, of the Motor Manufacturing Company, related the difficulty he had experienced in obtaining, among other things, English made springs for motor cars, and how, after many trials, he had had to fall back on French made springs, which were incomparably better than those of home manufacture. As regards steel cylinders, Mr. Iden stated that so long ago as 1897 he had exp[illegible]ed with these, as the result of [illegible]red cast iron. The question of the success o cylinder and jacket castings wa matter of design and suitable metal. As indicating this, he that whereas three years ago in cylinder castings ranged fro high as 60 per cent., now the more than 1 per cent. With re haust valves, he had found valv pure nickel gave by far the bes

The A. C. G. B. and I. w annual dinner at the Trocade rant, Piccadilly circus, on N The anniversary run in comn of the coming into operation Locomotives on Highways Ac place the following day, Nc Non-stop certificates are to b connection with this event.

Aluminum for Patt

In an article in the *Aluminu* is stated that aluminum is a val for making small carded patter count of its lightness, its chief much larger patterns can be c is possible with the soft metal a specific gravity of aluminum is that of the tin zinc and the ti alloys is about 7, and of zinc about 9. Thus with the same patterns of aluminum can be three times the volume of the patterns with the same liability age. Breakages of cards are frequent when they are made o than when made of soft metal.

Another advantage is that large patterns more can be p card, while often patterns whicl too large to card in the heavy be carded to advantage in alumi necessary amount of rappage to patterns in the sand is also thereby lengthening the life o while the molders like them m because of the greater stiffness handling. The metal is also adapted to light, flimsy patterns not bend out of shape from d by conforming to the shape of follow board, as soft alloy patte regard to the first cost, aluminu very cheap pattern metal on acc bulk, aluminum at 30 cents m terns cost about the same as mony alloy at 12 cents. In reg rosion of aluminum, patterns ha continual use for six years whic good condition as the new or more discolored. The patt smoother with use.

A steam carriage was damag and the owner, H. L. Aldern burned on face and hands recent Lexington, Mass. Cause of Owner filled gasoline tank with extinguished the burner fire.

:GINNERS
.GE.

The Steam Engine.

:ngines used on automobiles are gle acting or double acting, the ıg by far the most common. In acting steam engine the steam on one side of the piston, while le acting engine it alternately acts ides of the piston.

ɔmobile steam engines are made . A single acting steam engine ersible must have at least three and a double acting engine at

ıential parts of the steam engine ɔllowing: A cylinder into which ıdmitted and in which it expands; ight piston in the cylinder, which motion by the expansive force of ; a crank shaft which is connected ton by means of a piston rod and ing rod; a valve for admitting the the cylinder and for exhausting it ınsion, and a reversing gear for ıg the period of admission and s to cause the engine to revolve ıposite direction. We shall first :he double acting engine, as the ımon type.

The Double Acting Engine.

Some of the double acting automobile engines now upon the market are entirely open, while others are completely enclosed. Fig. 1 shows two views of a typical example of the former type. Referring to the figure, A A are the two cylinders, which are arranged vertically and with the common valve chest B between them. Both cylinders and the valve chest are cast integral, but the cylinders have separable heads on both ends and the valve chest is provided with an opening on one side for the introduction of the valves, this opening being closed by a cover plate. In the left hand drawing one of the cylinders and part of the valve chest are shown in section, and there are also shown one of the pistons, C, and the corresponding valve, D. The piston is fastened to a piston rod E, which passes through a stuffing box F in the lower cylinder head. It will be noticed that the lower cylinder head is cast in one part with the engine frame part G. The engine frame is in two parts, each depending from one of the lower cylinder heads, which are joined at their lower end and at the middle of their length by studs H and I I respectively. The frame parts are of T section. The cylinder heads are, of course, bolted to the cylinders.

At the lower part of the frame are located the bearings J J for the crank shaft, here shown as ball bearings, although they sometimes are of the plain brass bushed variety. The two cranks K K are located just outside these bearings; they are set, making an angle of 90 degrees with each other, as is universal practice with these engines. The two connecting rods or pitmen L L are shown provided with ball bearings on the crank pin end, although they, too, in some engines, have plain bearings. The other end of the pitmen is pivoted to the crosshead M by means of a crosshead pin, the crosshead sliding in the crosshead guides N N, which are bolted to the engine frame. The piston rod E is screwed into the crosshead M and is secured by means of a lock nut.

Upon the crank shaft just inside the bearings J J are two pairs of eccentrics upon which engage eccentric straps at the end of the eccentric rods O O, P P. The eccentrics of each pair are set at an angle of 180 degrees; in other words, opposite each other. The rods of each pair are pivoted to opposite ends of curved, slotted links R R. In the slot of the links is arranged a link block, and to this link block is pivoted the valve rod S, which passes through a stuffing box T into the valve chest, where the valve D is fastened to it. The eccentrics, eccentric rods, slotted links and valve rods form the valve operating mechanism. The two links can be shifted on the link blocks by means of a mechanism not shown in this drawing, which serves the purpose of reversing.

At the middle of the crank shaft is arranged the sprocket pinion U, by which the power is taken off the engine.

The steam from the boiler arrives in the valve chest through the steam pipe V, and as long as the throttle valve in the steam pipe is open the valve chest is filled with steam at boiler pressure. The exhaust steam leaves the engine through the exhaust pipe W at the side of the valve chest.

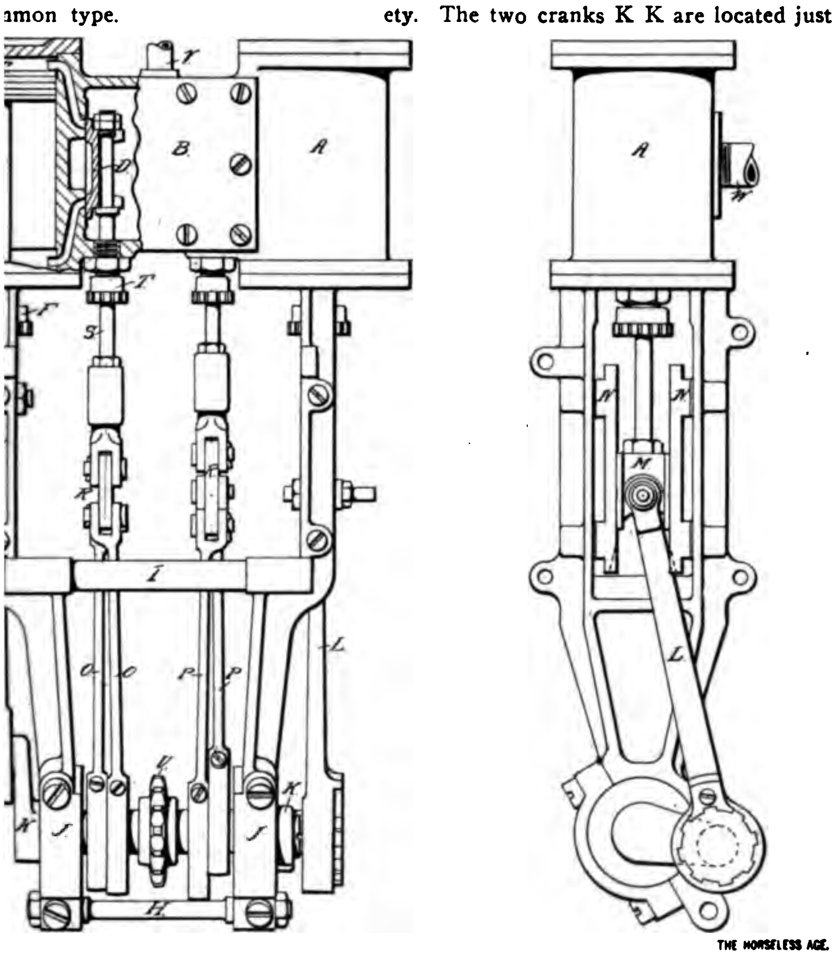
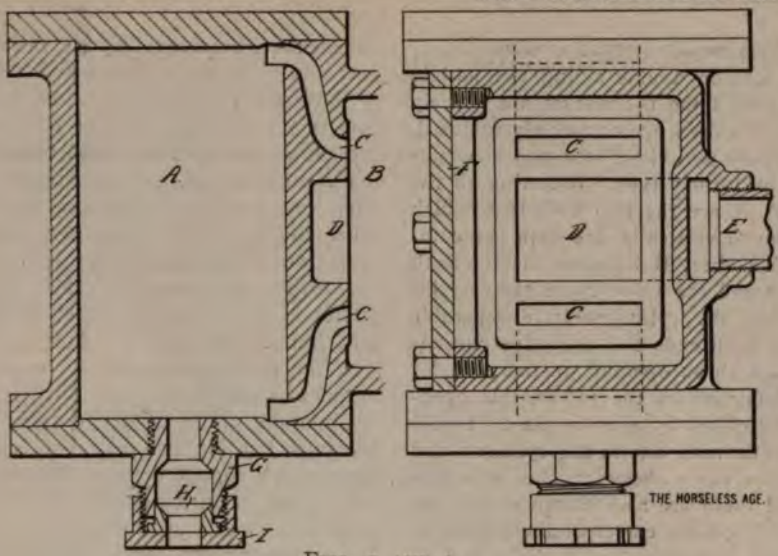


Fig. 1.

The Cylinders.

In Figs. 2 and 3 are shown a section through one of the cylinders and steam ports, and a section through the valve chest showing the port openings on the valve seat. Referring to these figures, it will be seen that the cylinders are cast with flanges at both ends, to which the heads are bolted. The cylinder chamber A communicates with the valve chest B by two curved passages C C of rectangular cross section called the steam ports. Between the openings of these ports into the valve chest is seen the opening of the exhaust port D, which leads from the valve chest to the exhaust pipe opening. The path of the exhaust steam is plainly indicated in Fig. 4, which is a horizontal section through the centre of the cylinders and valve chest. The two valves are shown in place here and the arrows indicate the flow of the exhaust steam from the chamber in the valve into the exhaust port and out through the exhaust pipe E. The exhaust from both cylinders leaves by the same exhaust pipe. The rectangular surface at which the ports open into the valve chest is planed smooth for the similarly planed



FIGS. 2 AND 3.

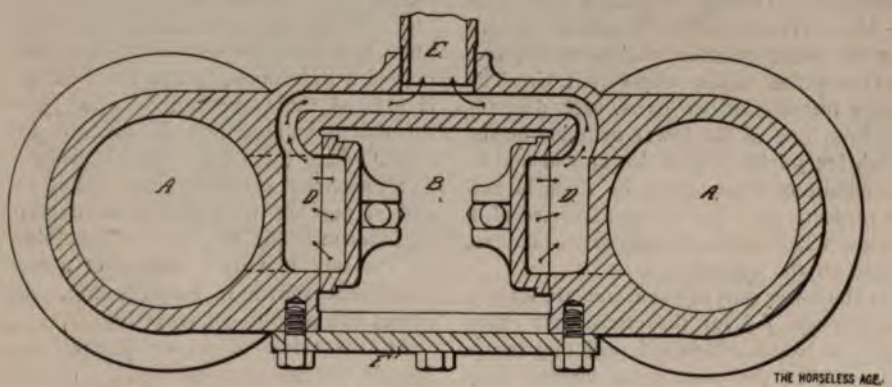


FIG. 4.

valve to slide on. The valve, which, as here shown, is of what is known as the common D slide valve type, puts the steam ports C C alternately in communication with the valve chest (to admit live steam to the cylinder) and with the exhaust port (to cause the expanded steam to pass out of the cylinder), as will be more fully explained later on.

F in Figs. 3 and 4 indicates the valve chest cover plate, which is secured in place by cap screws.

Screwed into the centre of the lower cylinder heads are shown (in Figs. 2 and 3) stuffing boxes for the piston rods. Such stuffing boxes were already referred to in the description of the automatic fuel regulator in a recent issue; they are used very generally on steam vehicles, and may here be described in detail. G is a nipple with a hexagon middle part. One end of the nipple is drilled to just let pass the piston rod, and the other end is counterbored to a larger diameter. Into this counterbore and around the piston rod is pressed the packing, which is sold in the form of rings of fibrous material saturated with graphite, etc. Next a metal ring H is forced into the nipple, called a follower, and is screwed home by means of the cap I, which is provided with a notched head. A spring latch engaging with any one of these notches holds the cap from jarring loose.

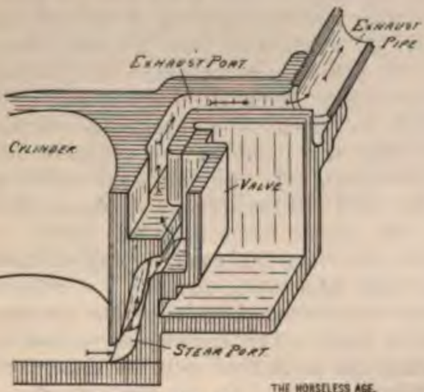


FIG. 5.

New 1903 De Dion-Bouton Surrey Phaeton.

The photo on page 540 shows the new De Dion-Bouton surrey phaeton model for 1903. It can be equipped either with a 9 horse power or a 15 horse power motor, this being optional with the purchaser. It has three speeds forward and a reverse and two brakes, one on the transmission and one on each of the wheels. All the tanks are carried forward on the gear and under the bonnet. The batteries are under the front seat and there is also space enough to keep extra tires and parts, tools and a repair kit. The space under the rear seat is left for packages and parcels.

The color and finish are optional, but the one in the picture is finished in a maroon color with red running gear. All the bright parts are full nickeled.

It is equipped with Michelin clincher tires, 30x4 inches, and has a guaranteed speed of 35 miles an hour. It is equipped with four springs and is a very easy riding carriage.

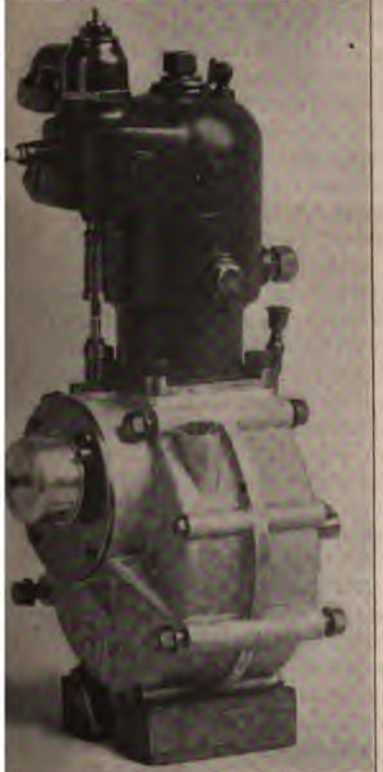
The Waltham Eight Horse Power Motor.

The accompanying photo illustrates a new water cooled, vertical gasoline motor

THE NEW "PEERLESS" RACER.

THE 1903 DE DION-BOUTON SURREY PHAETON.

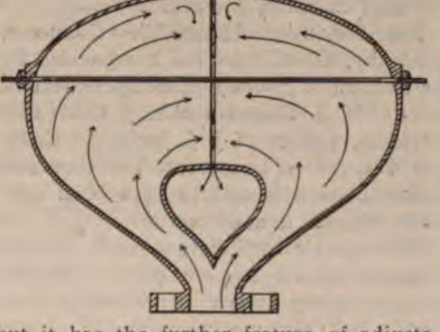
Waltham Manufacturing Company. motor will be used on the next year's Orient cars and will also be made trade. The bore of cylinder is 4 the stroke 4½ inches, and the aver-



eed under load is from 1,200 to 1,400 tions per minute. The height over 28½ inches; width over all, 12¾ and the width of the case, 6 inches. ywheels are inside the crank case; re 10½ inches in diameter and weigh unds. They are claimed to be perfectly balanced with the connecting rod and piston, and the motor is said to run almost without vibration. A maximum speed of 2,400 revolutions per minute has been attained.

The Ronan Adjustable Muffler.

In connection with the article on the bifurcated exhaust, published under "Our Foreign Exchanges" in a recent issue, our attention has been called to a muffler patented by A. G. Ronan, of Toronto, Canada. This motor is similar in principle to the bifurcated exhaust devices described,

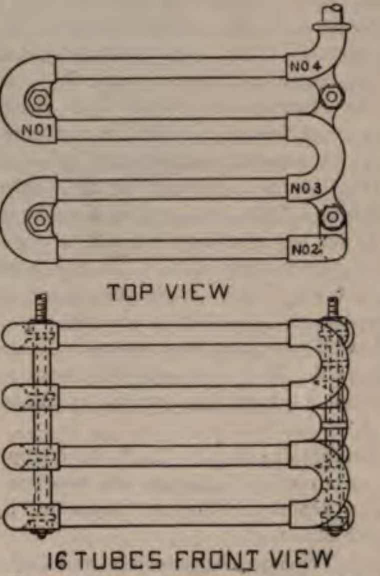


but it has the further feature of adjustability.

This muffler consists of two hollow members arranged with their exhaust mouths located oppositely. The exhaust gases enter at the bottom at what is known as the neck of the muffler, and are then diverted into the two hollow members, the sections of which gradually increase toward their mouths, which allows the expansion of the exhaust products. The two currents of the exhaust products impinge upon each other at the mouths of the two members, and then pass out through the space between the two members, which can be adjusted by means of a rod passing through the two members, which rod is threaded at its ends and provided with nuts for forcing the two members together more or less.

New Bliss-Chester Radiator Parts.

The Bliss-Chester Company, of Providence, R. I., have just brought out headers for radiating coils in the form of return bends, as illustrated in the accompanying



cut. These headers are made to take three-quarter inch radiating tubes of any length. The separate return bend castings can be spaced at even distances apart, and by the use of spreaders (made from short pieces of gas pipe or tubing) and tie rods the radiator can be bolted securely together, the tie rods passing up through the running frame forming a support for the radiator and holding it securely in position. The inlet and outlet casting can be tapped for commercial hallf inch pipe, or a short piece of tubing can be soldered in for hose connection. The outlet casting should be tapped for one-eighth inch commercial pipe, plug or drip cock, so as to be able to drain off the water from the radiator in freezing weather.

Joseph Tracy, of 513 Seventh avenue, New York city, has invented a new ignition device depending in its action upon the heat of compression in a special chamber in communication with the engine cylinder through a contracted passage. The motor is started with the regular electric ignition, and after it has run up to speed the battery is turned off and the engine continues running without the use of electricity. The device is said to be very simple and can be attached to many existing automobile engines. It has been fitted by the inventor to a Darracq engine, and is said to have given excellent results. It will shortly also be tried on slow speed American engines. No further details can be given until the patent proceedings have reached a more advanced stage, but the device can be seen in operation, we are informed, at the station of Smith & Mabley, 513 Seventh avenue, this city.

MINOR MENTION

Rumor has it that two residents of Toronto, Canada, are about to establish an auto factory at Strathroy.

Worcester Automobile Station, No. 1, Worcester, Mass., was recently damaged to the extent of $1,000 by fire.

The *American Machinist* has issued a very large special number on the occasion of its twenty-fifth anniversary.

The Columbus Motor Vehicle Company, Columbus, Ohio, report that they have the parts for 100 machines in hand.

An automobile club is on the tapis at Waterbury, Conn. Next spring will probably see an organization effected.

The Thompson Automobile Company, Olneyville, R. I., are reported about to introduce a steam bus service at Westerly, R. I.

Members of the A. C. A. have appointed as an official garage the storage and repair depot of Barry & Hayes in Fifty-eighth street.

The Tri-State Automobile and Sporting Goods Association will hold its second annual show at Detroit, Mich., February 9 to 14, inclusive.

F. L. Smith, secretary of the Olds Motor Works, Detroit, Mich., states that there will be no important change in the Oldsmobile for 1903.

The receiver of the American Electric Vehicle Company, Hoboken, N. J., has been authorized by the court to sell the plant for $15,000.

The Paterson Automobile Exchange has been opened at Paterson, N. J., by E. D. Carlough and W. H. Chadwick, at 217 and 219 Paterson street.

The first weekly meeting of the Automobile Club of America for the season took place on Tuesday evening of this week, the subject for discussion being the Reliability Run.

The Country Club Car Company has been organized under Maine laws, with a capital stock of $400,000, by Albert E. Knowlton, president, and Charles C. Smith, treasurer.

C. L. Horack is said to have invented a new cushion device for automobiles which makes pneumatic tires dispensable. "The cushion of the device contains both air and liquid."

A. L. Jones, H. B. Maxwell and others have organized the New Hartford Machine Company, New Hartford, N. Y., capital $5,000, to manufacture gasoline motors, transmission gears, etc.

The Cincinnati Automobile Company, 807 and 809 Race street, Cincinnati, Ohio, has been reorganized with $25,000 capital and Emmet P. Gray as president, Wilbur F. Duckwall secretary and treasurer, and W. S. Cain superintendent. A steam carriage designed by President Gray will be manufactured.

George S. Taft has been appointed auditor in the suit of John C. Speirs vs. The Locomobile Company of America.

The Auto Body Company, Lansing, Mich., has increased its capital stock from $12,000 to $20,000. Old officers have been re-elected for another year.

According to the latest reports the Ohio Automobile Company's plant will remain in Warren, Ohio, but the works will be enlarged and the name will be changed to the Packard Motor Car Company.

The Midgley Manufacturing Company are out with a broad guarantee that their tubular steel wheel is practically indestructible and offer to present a new wheel to any user of their wheels who breaks one in fair usage.

Jesse L. French and wife, of St. Louis, Mo., started for Florida the latter part of October in a St. Louis gasoline machine. Jesse French is the father of John L. French, president of the St. Louis Motor Carriage Company.

E. B. Olmsted, formerly with the E. R. Thomas Motor Company, Buffalo, N. Y., has been elected secretary and sales manager of the Conrad Motor Carriage Company, same place, who will soon bring out a line of gasoline machines.

At Waterbury, Conn., quite a number of new agencies have lately been taken: E. H. Towle represents the Rambler; L. S. White the Waverley Electric and De Dion gasoline machine, and F. P. McEvoy the new Franklin roadster.

The Long Acre Automobile Depot is the name of a new storage and repair station which is located at 307 West Forty-fourth street, New York city. The company proposes to deal in motor vehicles and to become agents for some standard make of machine.

The Sandusky Automobile Company, Sandusky, Ohio, has been reorganized by the election of James J. Hinde president in place of R. S. Thomas and E. J. Cable vice president in place of J. J. Jackson. C. H. Ely was chosen treasurer. Ten thousand dollars in cash is said to have been subscribed by the new officers.

The city clerk of Fergus Falls, Minn., writes in answer to an inquiry as to the state of feeling toward the automobile in his town: "One auto in county. No laws. No anti-feeling, I think. Everyone recognizes it as the coming vehicle. Seven runaways in one day on our streets, but taken as matter of course."

Kenneth A. Skinner, Boston, Mass., agent for De Dion, Bouton & Co., has on hand the parts for about forty motorettes and is therefore prepared to make quick deliveries. He is at work on a new racing car which will weigh little more than 1,000 pounds and will be propelled by a double cylinder 15 horse power motor.

W. E. Bryant, of Brockton, and R. R. Ross, of Boston, Mass., report that they recently drove a Packard model F from the latter city to New York in 14 hours, and that no tire was punctured and no stops were made on the road. One of the fenders, which are of aluminum, was fractured near the brackets by vibration.

Many of the big tonneau cars were used for the purpose of getting the tardy and feeble ones to the polling places on Election Day in Boston. Out of all the number used not one case of a failure on the part of any carriage was noted. H. B. Shattuck's big Packard and Fournier-Searchmont were among the hardest worked carriages in the city.

The Federal Manufacturing Company state that of the sixteen vehicles which were awarded first class certificates in the recent New York-Boston 500 Mile Reliability Contest, fourteen were equipped with their chains. A Diamond chain was also fitted to the White steam carriage which secured the highest honors in the recent English 650 Mile Reliability Contest.

A federation of clubs is reported to be in contemplation in Brooklyn, comprising the Kings County Automobile Club, the Kings County Wheelmen and an athletic and motor cycle club in process of formation. The federation is being promoted by George A. Needham, and the various clubs are to jointly occupy the club house of the Kings County Wheelmen and a country club house to be built.

The plumbers' supplies and lamp branches of the Badger Brass Manufacturing Company, Kenosha, Wis., have been separated, W. J. and C. N. Frost having retired and formed the Frost Manufacturing Company, to continue the former branch, while R. H. Welles and L. J. Keck have acquired all interests in the Badger Brass Manufacturing Company, and will continue the lamp business under that name. A New York office will soon be opened.

Scale in gas engine cylinder jackets in which hard water has been used can be effectually removed by filling the jacket with commercial muriatic acid, according to C. W. Andrews, Hamilton, Ohio, at a recent meeting in Columbus of the Ohio Gas Light Association. It is allowed to stand in the jacket until the decomposition of the scale, with the attendant evolution of carbonic acid gas, is completed. One application has generally been found sufficient, if the scale is light.

The Automobile Club of Minneapolis held its first regular meeting recently and elected the following officers: E. J. Phelps, president; George C. Christian, vice president; L. B. Newell, treasurer; S. D. Andrews, secretary; trustees, J. O. P. Wheelwright, A. F. Pillsbury, Franklin Crosby, J. F. Bell and F. B. Farman. The following committees were then selected: Ordinance—W. J. Murphy, E. J. Phelps, J. O. P. Wheelwright; runs, exhibitions, tours and contests—Harry Wilcox, Frank Forman, Henry Christian and J. F. Bell; membership—W. F. Pillsbury, Franklin Crosby and Dr. A. A. Law.

egislative and Legal.

istees of San Bernardino, Cal., ded to limit the speed of automo-

neda, Cal., an ordinance has been d limiting the speed of automo- 2 miles an hour, and to 8 miles in ely populated district. A horn, iistle must be sounded at all street and in approaching other vehi-

Townsend, of Peterboro, N. H., ght suit for $2,000 against the itomobile Company. He alleges ought a machine from defendant as guaranteed by the agent to r hill that a steam wagon would d that the machine failed to do

.ebanon, Ind., on November 4, a s scared by an automobile and derable damage. The automobil- ot stop and escaped the Lebanon 10 tried to arrest them. The po- 'horntown were notified by tele- d there the driver of the automo- arrested, being severely injured ib, which injuries may prove fatal. iard of Safety of Indianapolis has its clerk to write a letter to the ncil urging the passage of an or- regulating the speed of automo- providing that each machine shall mber large enough to be read, no ow fast the automobile is going. rd suggested that the ordinance force in New York might be a the council.

entatives of the Kansas City Au- Club recently appeared before a e of the city council to ask for a ion of the ordinance to regulate iles. They want certain changes nits of the low speed district, the iit increased from 12 to 15 miles outside this district, and examina- lrivers substituted for the identi- iumber requirement.

ported that H. W. Dupuy, a senior University, has effected a settle- h the widow and heirs of Ditmas Munro, who died in July last from inflicted by Dupuy's automobile reeks earlier. On good authority rned that Mr. Dupuy has paid e full limit allowed by the statutes ecticut for damages for the death an being when caused by the care- or negligence of another.

case resulting from the accident ers recently, the speed of the street ow being investigated. After the the car plowed through the mac- vement, leaving indentations 3 to 4 leep, ran a distance of over 200 ired the sidewalk, and, after strik- bank, toppled over on its side. iject will be taken up by the Board rmen at their next meeting, and it ited that action will be taken by the en looking toward regulating the of the cars.

Auto Accidents.

At Green Bay, Wis., on November 2, the wheel of an automobile caught in the street car tracks, which broke the axle off short near the wheel. The vehicle was occupied by Mr. and Mrs. J. F. Bertles, and the latter was injured.

On November 4, at East End, Pittsburg, during a heavy fog an automobile crashed into a wagon laden with pipes, the occupants, T. P. Holmes, of Pittsburg, and three friends, being thrown out. The injuries were not very serious, except in the case of Mr. Holmes.

The breaking of a front axle was responsible for an accident to an automobile occupied by Lebbius B. Miller and three ladies on November 5, near Little Falls, N. J. The machine is said to be of French manufacture and of heavy construction. It was driven at a high rate of speed when the accident occurred. Mr. Miller broke a leg and two of the ladies were also badly injured.

An automobile belonging to Theodore Havemeyer ran into a 10 foot ditch on the Hoffman boulevard, in Queens County, on the evening of November 4. There is an excavation on the boulevard caused by the building of a sewer by Contractor Charles Hart, of Brooklyn. It is said by those in the automobile that there were no warning lights in the road to indicate the excavation. One of the occupants broke a leg.

N. A. A. M. Matters.

At a recent meeting the committee of the N. A. A. M. decided that during the coming show the vehicles will not be allowed to enter the exhibition building with gasoline in their containers. A special committee has been appointed to provide entertainment during the show week, this committee consisting of P. H. Deming, Percy Owen, H. Ward Leonard, O. J. Woodward and Mr. Gibbs.

The following firms were elected to active membership: The Sintz Motor Car Company, Grand Rapids, Mich.; H. H. Franklin Manufacturing Company, Syracuse, N. Y.; Studebaker Brothers Manufacturing Company, South Bend, Ind., and Prescott Automobile Manufacturing Company and Berg Automobile Company, both of New York; and the following to associate membership: New Process Rawhide Company, Syracuse; Whitney Manufacturing Company, Hartford, and Conger Manufacturing Company, Groton, N. Y.

R. E. Olds, of the Olds Motor Works, and Mr. Gibbs, of the Electric Vehicle Company, were chosen to fill vacancies in the executive committee, caused by the resignation of Dane E. Rianhard and J. H. Ballantyne. The association further decided to present to the committee of the New York Board of Aldermen a petition that the contract with the Street Sprinkling Association be not renewed.

Book Review.

"Théorie des Moteurs à Gaz." By George Moreau. Published by Ch. Beranger, 15 rue des Saints Péres, Paris.

During the earlier part of the present year a series of lectures on the theory of the explosive engine was given by M. Moreau at the club house of the Automobile Club of France, students from the various scientific schools of Paris being invited to attend. These lectures are contained in the present volume, the theory having been further developed and completed.

In his introduction the author says that in delving into the theory of the explosive motor he will confine himself strictly to that subject, without undertaking a study of actual machines, which would require considerable development and description. His aim is to analyze the phenomena which, in one way or another, determine, alter or accompany the operation of such motors, without regard to the form of the parts and the arrangements employed.

"No doubt some persons will ask themselves what is the use of all these theoretical considerations, and why anyone should want to occupy himself in studying out on paper the operation of an engine, when it is sometimes very difficult to discover the causes of irregularity while the engine is in motion. These same persons will probably deny that any interest attaches to the calculations and will be satisfied only with trials or experiments or modifications made in the parts of a motor in service.

"To these people I reply that the theory is not all sufficient, but that it is very important; that it furnishes no absolute results, but gives indications which open certain lines and close others—in brief, that it saves time in trials and limits the range of experiments by showing the way one should proceed and what to avoid."

After some generalities about explosive motors and classification of the latter, the author, in Chapter II, takes up the subject of thermodynamics. He develops the principle of the conservation of energy, states the various laws governing the expansion and temperature alteration of gases and finally deals with the various theoretical cycles employed in heat engines. The treatment throughout is highly mathematical.

In the last part of the book the various questions of practical importance in the design of explosive engines are dealt with, such as the speed of propagation of inflammation, the action of the cylinder walls, conditions of highest efficiency and also the use of such fuels as kerosene, alcohol and acetylene—from a theoretical standpoint only.

To those who are mathematically inclined the book will no doubt prove of interest and value.

LEGISLATIVE AND LEGAL.
Issue of November 5, 1902.
Price 10 Cents.

Oil Motor Cars of 1902.

(Abstract from a paper read by Capt. C. C. Longridge before the British Institution of Mechanical Engineers.)

There are two prevailing positions and two classes of engines. As regards position, the vertical is far the more common. From the standpoint of the automobile engineer, the case stands thus: Advocates of vertical fixing assert better accessibility and adaptation to the usual method of drive; those of the horizontal claim less vibration, lower centre of gravity, easier lubrication and room for a longer stroke—a requirement for the use of alcohol and heavy oils. Between the types of engines the comparison stands thus: Simplicity and probably economy lie with the single acting Otto; greater smoothness of running with the one cylinder two piston type. From the persistency and extension of its use, it is clear that manufacturers consider this latter advantage to more than compensate for increased complication.

The author himself holds that the ultimate evolution will be the impulse every revolution engine. The aim of manufacturers is obviously toward elimination of change speed gear by increasing the flexibility or elasticity of the motor. The author has recently patented an engine in which an impulse in every cylinder is obtained at every revolution. The cycle is exceedingly simple, and as high compression is used efficiency and economy should result. The motor consists of two, or multiple of two, side by side cylinders, closed at both ends. The rear end forms the compression chamber, in which the explosion takes place; the front end is an air receiver. The front end or air chamber of each cylinder is connected by a pipe or passage to the rear end or compression chamber of the other cylinder. This tube or passage is provided at both ends with valves, and serves to transfer air from the air chamber of the one cylinder to the compression chamber of the other. The compression chambers are provided with ample exhaust valves, and the air chambers are fitted with automatic inlet valves. All other valves are mechanically operated. The oil, atomized by a small compressed air jet, is fed, under control of the governor, into the combustion chamber at the end of the compression stroke.

The action is as follows: Assume the piston in No. 1 cylinder to be at the end of its compression stroke, and that in No. 2 cylinder at the end of its working stroke. The front of No. 1 cylinder is full of air; the rear of No. 2 cylinder is full of burnt gases. The compressed charge in No. 1 is now carbureted and fired, the piston advances, compressing the air in front; the piston in No. 2 retreats, expelling the waste gases. At about half stroke the exhaust valve in No. 2 is closed, and simultaneously the inlet valves (one at either end of the inlet tube) are opened, and the full charge of air, already under compression, is pumped from the front of No. 1 cylinder into the compression chamber of No. 2. On the completion of the No. 2 cylinder compression stroke, atomized oil is injected (the Diesel engine illustrates the method) and is fired; at starting, by the electric spark, and afterward, perhaps, by hot surface contact ignition, oil injection can be effected at once or gradually, as desired.

The advantages claimed are: Impulse every revolution in each cylinder without extraneous pumps; very perfect cushioning and easy running; very high compression, with diluted charge, and therefore economy; absolute immunity from premature ignition, a factor that militates against high compression in other engines; high charge temperature of the charge, without corresponding rarefaction, therefore very favorable conditions for easy ignition, rapid inflammation and high power; a method of oil injection that admits of the engine being run as an explosion at constant volume engine, or a combustion at constant pressure engine; equal adaptability to gasoline or heavier oils.

That there is a large proportion of the burnt gases left in the cylinder is thought to be of no consequence, as the weight of the incoming charge can be made independent of rarefaction by imparted heat, and the risk of premature ignition is avoided; the presence of exhaust gases is not detrimental; and, in view of the higher compression used, the engine will be more economical than the gasoline motors now on the market. Nearly two years ago the author strongly recommended a motor company to adopt governing on the exhaust (i. e., reducing the volume of fresh charge by retaining a portion of the exhaust), in preference to volume throttling. But the management could not be brought to recognize the economy to be obtained and adopted volume throttling. Motors governed on the exhaust have since established their claim to greater economy, and the 1894-5 conducted experiments of Frederick Grover bear out the views held by the author. The general results of Mr. Grover's experiments, which "show that the presence of the products of combustion in certain mixture actually raises rather than diminishes the maximum pressure obtained," are:

1. * * * That the highest pressure are obtained when the volume of air is only slightly in excess of the amount required for complete combustion.

2. That higher pressures are recorded when residual gases take the place of an excess of air.

3. That when the volume of the products of combustion does not exceed 58 per cent. of the mixture, it is explosive, provided that the volume of air is not less than 5.5 times the volume of coal gas.

4. That the time of an explosion is much reduced when excess of air is replaced by the products of combustion.

HIGH COMPRESSION.

The principle of high compression, which so greatly advanced the economy of gas engines, has scarcely yet been applied to gasoline motors. Reduction in fuel consumption is the great advantage of increased compression, or, to state it otherwise, in any given mixture; the explosion pressure produced by ignition is proportional to the charge compression. In practice there are, of course, limits to the degree to which the charge can be usefully compressed. These limits are fixed mainly by four conditions: First, the difficulty of keeping piston and valves tight; secondly, the necessity of seeing that the negative work and the increased friction due to high compression do not exceed the greater efficiency obtained (the ratio of increase in efficiency decreasing as the pressure is increased); thirdly, the desirability of avoiding the excessive shock of a rich charge fired under high compression; fourthly, the risk of premature ignition in a highly compressed charge. A very considerable advance on prevailing compressions will have to be made before the first two causes of limitation come into play. The influence of the third factor—namely, the automobile requirement of an easy running engine—is already at work. But the complete and satisfactory fulfillment of this requirement is not incompatible with the use of higher compressions than are now in use. All that is required is to reduce the richness of the charge by using less gasoline, until the violence of the explosion is sufficiently reduced, the result being an easy running motor, working under the conditions of maximum economy—namely, high compression and less loss of heat owing to the lower combustion temperature. Poor charges may, it is true, lead to increase in cylinder dimensions, but to obviate increased weight we may yet have recourse to steel cylinders and light water jackets. The third consideration—namely, danger of premature ignition—is also a matter of present moment. Two ways of surmounting this obstacle to high compression may be suggested. The first is to admit the gasoline at the end of the compression stroke. The second is a system of internal cooling by water injection.

In the matter of piston speed, this year's engines show a general return to the earlier speeds given by 700 to 800 revolutions per minute normal running. This gives less wear and tear on the motor, gear and igniting accessories, and less difficulty in filling the cylinder; while reserve power by acceleration is held in hand. In respect of slow, yet steady action, the impulse every revolution motor would possess a decided superiority.

MATERIAL AND METHODS OF MANUFACTURE.

With very rare exceptions the present automobile motors are cast iron, solid head, water jacketed cylinders, cast complete with valve box in one piece. It is scarcely possible to imagine a design better adapted to give trouble in the foundry or the workshop, or one less in accordance with metallurgical requirements. A casting of this description, intricate in shape,

ıgles, curves, bosses, ribs, varying ›es, etc., enormously increases the :s of molding and producing sound The number of wasters that must occur in the foundry,.in the ma- d testing shops, is quite a serious Apart from this commercial ob- ı casting of this design is ill suited urpose. First, because the varia- thickness and the ribs between the ›duce irregular expansion and con- Secondly, because it almost pre- ıe possibility of using the best iron purpose, the founder naturally with a very fluid running mixture. the majority of makers have been ›y the "drawing office" solid head, cketed design, a few have followed of casting the cylinders separate ling a light aluminum, or rolled rater jacket. This method admits npler casting, for which the best n be used.

: question of what is the best metal a difference of opinion. Professor inclines to white hematite, cast in olds. Both Professor Hiorns and r Turner recommend, as an alter- he use of the closest and hardest : can be conveniently machined.

ısting of a cylinder, where there is icacy of design, should be a matter :ial precautions. While it is not ›le to employ a system of fluid sion, such as the Whitworth or the cent French Harmet system (tré- some equivalent should be sought ing on adequate head.

w, however, of the troubles arising rous cylinders and for other rea- e author favors the substitution of ›es for cast iron cylinders. Light- rength, freedom from flaws, easy and probably, on the whole, cheap- : much in favor of this material for otor cylinders. Steel tubes screwed ast steel or cast iron head should good job. If the output warranted al cost in dies, pressed steel heads : made. But the steel cylinder itself ıvolve no great expense.

's. Panhard & Levassor in their cer are said to have used cast steel s, with a copper water jacket. In ew "Centaure" motor, in the 40 ›ower racer of Messrs. Charron, 't et Voigt, and in the Cannstatt · racing cars, steel is the material nd, under the severe conditions of no running difficulties have been d. There is really no reason why ıould not successfully and advan- ly replace cast iron.

ing steel cylinders, cast iron piston night be retained. For these, a fine grained, elastic iron, with ap- ıtely the following constitution, ›e the best:

nbined carbon	0.50
:on	2.00
›hur	0.10
Manganese	0.50
Phosphorus	0.80

Greater elasticity and resistance to external pressure are obtained by casting from pots in a chill mold.

ENGINE DETAILS—THE VALVES.

The present usual practice is an automatic spring induction valve, and a mechanically lifted exhaust valve. The combination is exceedingly crude, and a few manufacturers are now waking up to the advantages of mechanical operation for both valves.

As regards the material for valves, their seating and fitting, there is again difference of opinion. There can be no question that the spindle and head are best made of different material. For the head the author favors nickel steel; cast iron wears well, but for small valves it seems hardly strong enough. A weak point in one piece valves is the neck. Where trouble has arisen, and there has been plenty of it, with burning, irregular wear, and breakage of valves, it has usually been ascribed to weakness in the neck, unsuitable material, faulty methods of lift, throttling of the exhaust by insufficient area of the valve, exhaust pipe or silencer. Any deficiency here may lead to broken valves. With a choked exhaust, the pressure left in the cylinder, combined with the spring, may produce hammering of the valve on its seat. In time this leads to brittleness and fracture. There is, however, another cause of a very different nature which the author suggests as a probable source of much of the irregular wear and ultimate fracture of valves. Those conversant with the construction of horizontal plunger pumps will recognize a defect frequently found in otherwise well designed machines. This is the placing of the valve seat on a level with the waterway. The effect of such an arrangement is that not only is the discharge greater on one side than on the other, but the water, diverted into a new direction, while in the act of passing the valve, exerts a tilting force on it, pressing the valve towards the waterway. The results are irregular wear, sticking and hammering of the valve on its seat.

Now, the usual disposition in the vertical motor is similar. There is, therefore, the same unequal discharge, with the similar tilting action and tendency to force the valve from its true position.

But there is this difference: In the pump the stroke is comparatively slow, the flow tardy, the pressure low, the valve, spindle, seat and guides cold and in the best condition to resist wear; whereas in the motor the valve beat is extremely rapid, the gas flow swift, the pressure high and all surfaces so highly heated as to be in the worst condition to withstand attrition and deformation. Thus the evils of bad design in the pump are much aggravated in the case of the motor, the tilting action being greater and the irregular burning and side wear more rapid.

The remedy in both cases is the same. The valve seats should be kept respectively below the waterway or the gas passage so as to permit the flow of water in the one case to rise upward until clear of the valve before taking a new direction, or the rush of gas in the other case to acquire a straight downward course before reaching the valve.

Far the better practice would be to avoid port passages and place the inlet and the outlet valves on the head of the combustion chamber. With the heavier oils this position has the additional advantage of direct charge admission without a possible condensation by contact with the port and cylinder walls.

In this year's motors there is among the best makers a marked and very praiseworthy tendency toward increased valve area. There is no difficulty in calculating the induction valve area, but the problem of the exhaust valve is less simple. In any case the common practice of making inlet and outlet valves of equal area cannot be right.

CARBURETORS AND CARBURETING.

These are roughly divisible into two systems—aspiration carburetors and positive feed carburetors. Of the two, the latter, in the author's opinion, is unquestionably the better system. Most aspiration carburetors draw the gasoline from a jet, communicating with a constant level chamber or reservoir. The result is inaccurate and faulty gasoline supply, since the force of the suction varies with the speed of the engine. Rich charges are thus obtained when the engine is racing, and poor charges when it is slowed down from overload, the reverse of what ought to be. Makers are now recognizing this defect, and are introducing devices more or less closely approaching positive measurement.

There is a good deal of evidence to show that the problem of carburation is at present eliciting the attention of inventors—a sign that something yet better is wanted. To take one among many, Messrs. E. F. Bradley and W. R. Pidgeon have recently published a new design of carburetor,

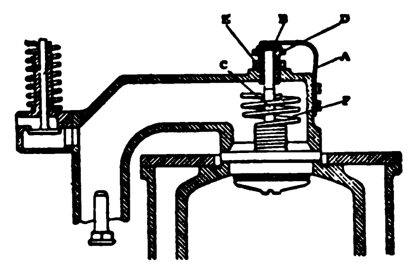


Fig. 1. They found by experiment, as might have been surmised *à priori*, that, to get the maximum power at any number of revolutions per minute, the jet of the carburetor must be larger for low speeds than for high ones, and, as it is difficult to

adjust so small a thing as the hole in the jet, they insert a small air spring valve in the air pipe between the carburetor and the induction valve. This auxiliary valve opens wider and wider as the engine speed increases, closing again as it decreases, thus decreasing or increasing the suction on the jet. The idea of an auxiliary air supply for this purpose is not new.

A number of recent devices on similar lines show that the tendency of the present motor is, and rightly so, toward discarding the crude action of the suction jet, pure and simple, in favor of positive measurers, preferably under control of the engine governor.

In connection with carburation, the author raises the point whether it be better to carburate the incoming air, or to first introduce the air and then carburate it, that is, add the fuel, at the end of the compression stroke. This latter method avoids all possibility of premature explosion, and thus enables higher compression to be used. On the other hand, it is urged that the charge will be imperfectly mixed, and give imperfect and irregular combustion, The author is doubtful whether for gasoline there is anything in this objection, or whether, if there is anything, it is not more than discounted by the advantage to be gained. It is certain that a number of gasoline motors run, and run successfully, by merely injecting the gasoline into the cylinder and letting the air and heat do the rest. On the whole, the author thinks that, for gasoline at least, a good deal more stress is laid on pre-mixing than need be, and that carburation at the end of the stroke, inasmuch as it admits the use of higher compressions and has another important advantage, is probably as good if not better and more economical than the more ordinary method. It probably requires high compression.

(To be continued.)

Autos in the Signal Service.

Speaking of the use of motor vehicles by the Signal Service Corps, General Greely is quoted as saying:

"Three different types of machines have been tried—the electric, steam and internal combustion. The internal combustion type seems preferable for war purposes, especially one using either kerosene or other oil. It has been impossible so far to find a reliable American manufacturer to construct for the Signal Corps an automobile along such indicated lines of structure, fuel and fittings as are deemed necessary for efficient use as self propelling vehicles, forming part of flying telegraph trains or balloon trains, but it is thought that such type will soon be developed. The experience of the Signal Corps has been confirmed by experiments of the foreign military experts, which proved the utility, reliability and efficiency of auto propelled vehicles for military purposes."

New Street Drying Machine.

Street Cleaning Commissioner Woodbury, of New York city, has invented a machine for removing the water sprinkled on asphalt streets and gave a demonstration of its effectiveness on Fifth avenue and Twenty-third street one day last week before the members of the A. C. A., who have been complaining about the usual flooded condition of this thoroughfare. The atmospheric temperature at the time of the experiment was 35°, and consequently the experiment was not as successful as it would have been in warmer weather.

Boston Agencies.

The White Sewing Machine Company will have B 27 and B 26 of the New York and Boston Endurance Run on exhibition at the Boston agency, 589 Tremont street. There will be quite a change at the White agency this fall, the local management contemplating an enlargement which will include a splendidly equipped repair shop and salesroom.

The new 1903 Peerless will be on exhibition in a few days at the Boston agency, 245 Columbus avenue.

A. T. Fuller has taken the agency for the Northern Manufacturing Company's gasoline automobiles.

The Knox Water Gauge Reflector.

A new water gauge reflector for steam carriages has recently been placed upon the market by Frank J. Knox, of Hartford, Conn. It is made of brass and finished in nickel or black enamel. The reflector is simply attached to the water gauge by means of a screwdriver; it shows the height of the water in the glass as a solid bright red column, the full size of the glass. The steam space in the glass is shown by a narrow red line. The reflector thus shows distinctly the height of the water in the glass.

Trade Literature Received.

Westfield Automobile Parts.—Catalogue of the C. J. Moore Manufacturing Company, of Westfield, Mass.

Lathe Dogs, Clamp Dogs, Die Dogs.—The Billings & Spencer Company, of Hartford, Conn.

A Modern Machine Shop Outfit.—Catalogue G of the Garvin Machine Company, Spring and Varick streets, New York.

Rubber Exports from Para.

According to K. K. Kenneday, consul at Para, the shipments of rubber from the Amazon Valley this season amounted to 299,997 tons, or 2,317 tons more than in 1900-01.

In the season just begun it is believed that a record breaking crop will be harvested. The rubber fields of the lower river, and especially on the isla slowly but surely failing, both in and quality; but the decrease is m made up by the development of n and the expansion of the old field Upper Amazon. While all the r portant tributaries of the Amazon plying their full quota of rubber, making a promising increase, int focus in the now famous Acre terr in Southeastern Ecuador. In the reached by the Purus (of which is a tributary), Jurua, Beni, Madre Javari, Ucayali, Japura and oth affluents of the Amazon, which Peru, Bolivia and Ecuador, ther limitable rubber forests as yet un which will now be gradually d Many seringueiros, or rubber g are headed for these regions, and ported that several syndicates are begin operations in new fields in and Peru.

Bolivia continues to offer ind for the colonization and developme vast area of rich rubber and mini tory.

He is informed that the govern the state of Amazonas has grante clusive privilege of receiving, cut packing all the rubber produced state to one wharf company. T tion of this monopoly will injure ber trade of this region, but Peru and Ecuador will be the benefici rubber growers and gatherers seeking to escape the new re which entail considerable expe trouble upon exporters.

Shipments from Para for the July 1, 1901, to June 30, 1902, w tons to the United States; 7,027 Europe; a total of 13,925 tons.

Shipments from Manaos and from July 1, 1901, to June 30, 19 7,168 tons to the United Stat tons to Europe; a total of 16,072

Shipments from Para, Man Iquitos, from July 1, 1901, to 1902, were 14,066 tons to the States; 15,931 tons to Europe; a 29,997 tons.

The total of crop from July 1, June 30, 1902, was 29,997 tons crease over crop of 1900-1 of cent.

The shipments of rubber fr Amazon Valley, for the seasons to 1901-2 inclusive, were as follow

Year.	To United States. Tons.	To Europ Tons.
1896-7	9,848	12,368
1897-8	11,422	10,796
1898-9	12,398	12,848
1899-1900	12,474	14,407
1900-1901	15,194	12,486
1901-2	14,066	15,930

The Grant-Ferris Company, Tro are building a gasoline tonnea rumor that W. S. Howard had company is untrue.

OTOR VEHICLE
ATENTS..

United States Patents.

06. Steam Engine.—Paul H. White, ianapolis, Ind. October 21, 1902. October 3, 1901.

invention relates to improvements gle acting multiple cylinder steam s designed for steam wagons, and its objects to produce a compact mparatively powerful engine which e cheaply constructed, to provide by which the cylinder may be con- to run either simple or compound, provide a peculiar connecting rod action for oppositely arranged pis-

connecting rod is provided at its end with a threaded portion and a d portion. The threaded portion is d into a head over the piston pin he reduced portion engages with the Access is had to the interior of the through an opening closed by a e plug. The interior of the piston ked with some heat insulating ma-

opposite connecting rods are iden- with the exception of their crank One of these rods is provided at nk end with a socket slightly less semi-circle in length and of a radius the wristpin of the crank. Adjacent socket and concentric therewith the provided with a pair of segmental s, which project from the sides. ther rod at its crank end is of a ess equal to the thickness of the iston rod, including the flanges, and vided with a socket similar in size tent. In order to prevent displace- of the two connecting rods and to running connection when the parts perated without pressure upon the s, there is provided a yoke which is l in its middle, so as to form a pair aps, between which may be passed one of the rods. The ends of the yoke are bolted to the crank end of one rod, and the straps thereof pass around and outside of flanges of the other rod. A limited movement of each crank with relation to the other upon the wristpin is allowed, owing to the shortness of the sockets. By this construction each connecting rod has a bearing upon the full length of the wristpin.

Each high pressure cylinder is provided with a single port 37, which is both an admission and exhaust port, and this port communicates with a cylindrical valve chamber 38, within which is mounted a valve, 39, having a reduced middle portion 40. Leading into this chamber 38 is a steam inlet 41, the said inlet leading also into a cylindrical valve chamber 42. In chamber 42 is mounted a compounding valve 43, exactly like valve 39. Each low pressure cylinder has a single port 45, which serves both as an exhaust and admission port, and said port leads into a cylindrical valve chamber 46, in which is mounted a valve 47, having a reduced middle portion 48. Leading from about the middle of chamber 42 is a bypass 49, which returns into the chamber 42 near its outer end, and leading from chamber 46 is a bypass 50, which is similar to bypass 49 and returns into chamber 46 near its outer end. The two chambers 42 and 46 are connected by a connector 51, which is a single casting provided with a pair of bosses, fitting into the outer end of valve chamber 42 and the outer end of valve chamber 46. The connector is bolted into place, so as to form steam tight joints, by means of suitable bolts 54. Running through connector 51 is a passage 55, which forms a connection between the outer ends of the bypasses 49 and 50. The connector 51 is also provided with a passage 56, entirely independent of the passage 55 and forming a direct connection between the outer ends of chambers 42 and 46. Leading from passage 56 is an exhaust passage 57. A passage 58 forms a connection between the outer end of chamber 38 and the outer end of chamber 42.

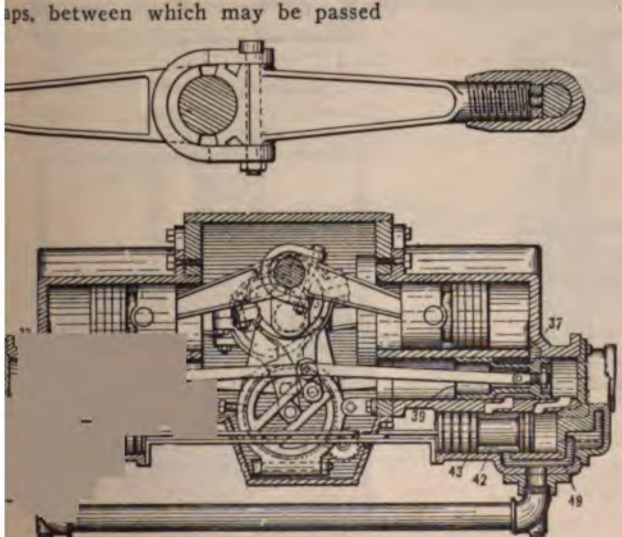
The two compounding valves are connected by links to a shifting lever.

711,667. Means for Regulating Electric Motors.—Robert Lundell, of New York, N. Y. October 21, 1902. Filed May 10, 1902.

One of the objects of this invention is to so vary the strength and character of the field magnet of the motor at the different notches on a speed regulating controller, in combination with variations in the voltage supplied to the armature, that the motor will automatically become a generator, charging the batteries, (a) when the controller is moved from a notch of high speed to one of lower speed, thus checking the speed of the vehicle, and (b) when the vehicle is running down hill; and to so increase the efficiency of the motor when acting as a generator that it always may be used as a recharging generator in the station by uncoupling the driving gear of the vehicle and connecting the motor shaft to any suitable source of power.

In the accompanying drawing the upper part illustrates the stationary contacts of a "cylinder" type of controller and also a development of the movable contacts. The lower part shows the various connections effected. The motor is compound wound and the battery is arranged in four trays or groups of cells. The controller gives fourteen different combinations. In the first position the shunt field of the motor is connected across the cells of one tray. In the second position the motor is connected to the battery grouped in four parallel rows. In the third position the series field coil is shunted; in the fourth a resistance is introduced in the shunt field coil; in the fifth another step of resistance is introduced in the shunt field.

The battery is successively connected entirely in series, partly in series and partly in parallel and completely in parallel.



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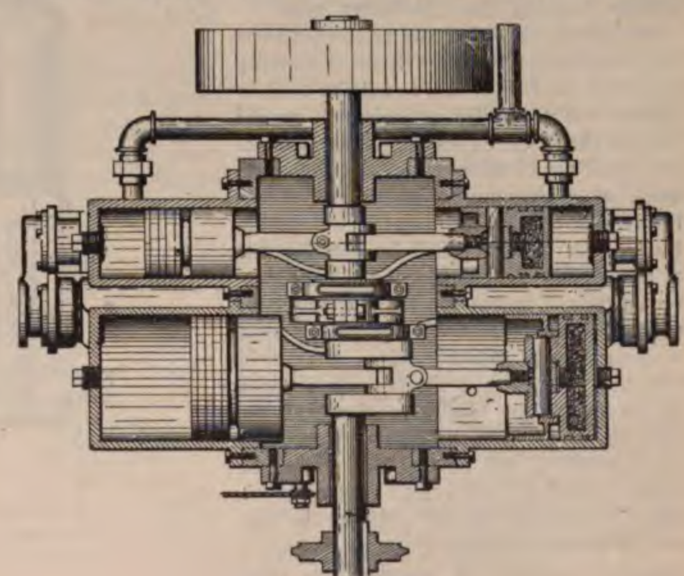

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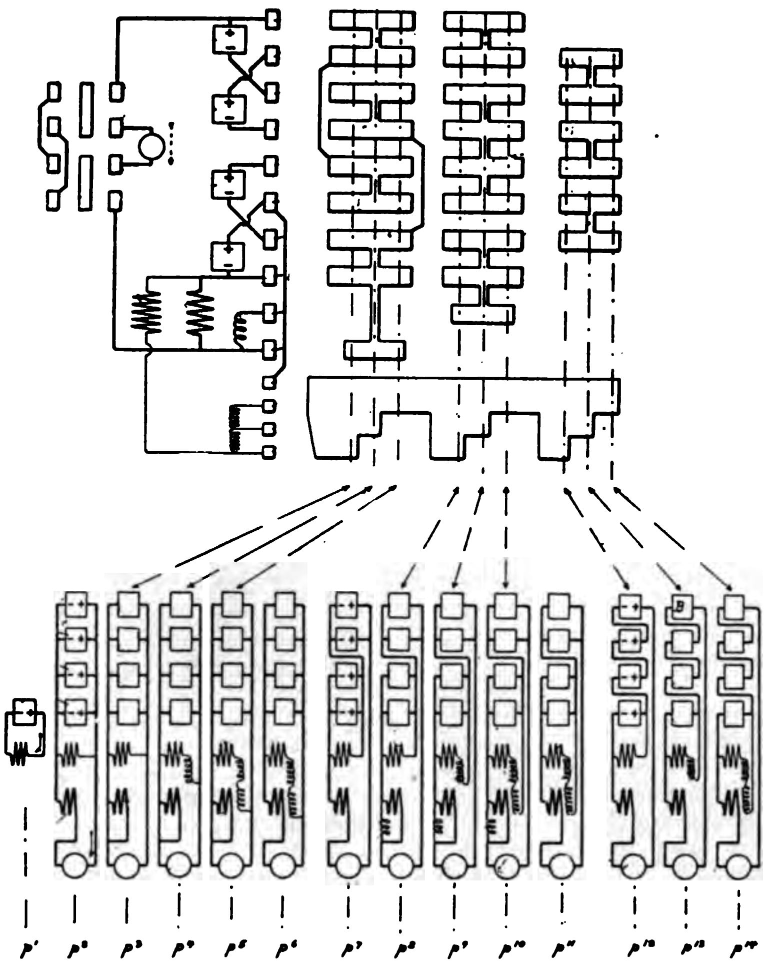


No. 711,667.

Five of the positions of the controller are transition steps and are not used in regular operation.

It will, of course, be understood from the foregoing description that the motor will have a very wide range of speed, from the slowest speed at low voltage and strong field to the highest speed at four times the voltage with a weak field. That set of battery cells which is called upon to furnish current for the shunt field winding may preferably be of somewhat greater capacity than the other cells.

Supposing now that the controller is at the last notch and the vehicle is running at a high rate of speed, it will be evident that as the controller or switch is moved toward the off position the momentum of the vehicle will soon cause the motor to work as a dynamo, recharging the batteries and checking the speed of the vehicle. The checking will be quite gentle at first, owing to the fact that as the current reverses in the armature it will also reverse its direction in the series field winding, and thus reduce the field strength; but even at the seventh position of the switch the checking effort and the recharging capacity will be considerable on account of the strong field from the shunt winding. As the controller is moved on toward the off position the motor becomes more and more efficient as a dynamo, checking the speed of the vehicle and recharging the batteries until at the first position of the controller the speed of the vehicle is reduced to a minimum and the recharging action ceases. As the speed is extremely low at the first notch, a slight pressure on the ordinary foot brake will bring the vehicle to rest when the switch is thrown to the off position.

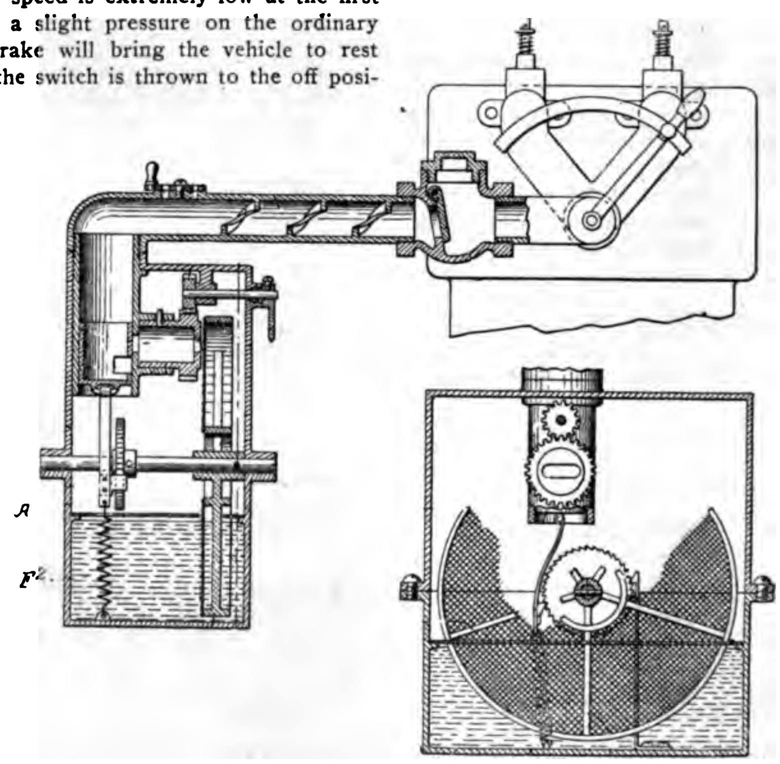
712,542. Carburetor for Explosi gines. Thomas B. Jeffery, of Chica November 4, 1902. Filed October 2

The carbureting liquid is brought mouthpiece of the duct, through w passes to the engine cylinder by m a capillary web or screen. The pres vention relates more particularly to for giving motion to the capillar means for preventing the vapor a from being forced out by back p upon the return stroke of the piston cylinder, and means for breaking more thoroughly intermixing the a vapor on their way to the cylinder.

The carbureting liquid is containe chamber in which is arranged a sha ing bearings in the walls of the ch To this shaft is fixed a spoked wh which is fastened the screen, and ratchet wheel, with which engages attached to the head of a piston cap motion in a vertical cylinder in com cation with the engine cylinder. A tension spring holds the piston norm its lowest position. The suction in t gine cylinder during the intake stro this piston until a port in the piston opposite a port in its cylinder, t which the air and vapor mixture ent intake passage. When the suction engine cylinder ceases the small pi drawn downward by the coiled spri tached to it. During the up stroke piston the pawl attached to it engag the ratchet wheel and causes the la revolve.

712,546. Motor Vehicle.—Olive Kelly, of Springfield, Ohio. Noven 1902. Filed May 31, 1902.

This patent relates to features of a truck. The engine, variable driving and differential gear are mounted



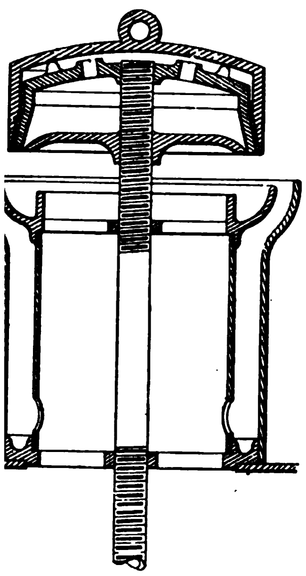
No. 712,542.

ıich has bearings on the rear axle ıspended from the body in front. s and boiler are hung below the frame. The front axle is guided :als fixed to the platform frame, proper being surrounded by a th pins extending therefrom horiınd vertically. The horizontal pins slots in the pedestals and the upxtending pin is surrounded by a ring through which the frame is l on the front axle. Pedestals and rings are also used on the rear

. Friction Clutch.—M. F. McMaWorcester, Mass. November 4, led February 27, 1902.

. Vaporizer and Burner.—N. L. f Los Angeles, Cal. November 4, led November 7, 1901.

se portion of the device comprises



ical chamber having a spider in its d in which an oil supply pipe is and extends vertically above the e chamber. The upper end of the s screwed through a flanged cenion of an inverted cup and prohtly above the same. This cup is h a flaring periphery at its lower orm a seat for the lower edge of a er than the cup, to leave a space the same and the cup to form a g chamber, and the cup is made nings permitting the escape of vathe receiving chamber formed by and flanges are provided around said openings to prevent the entrance of oil therein when the burner is to be first lighted. On top of the cap is provided a perforated lug to facilitate the removal of the cap when desired.

On the upper end of the cylindrical chamber an annular cup is supported and is provided on its lower face with a circular flange.

On the pipe a disk is screwed and is located at the lower end of the cup, and can be adjusted up and down to regulate the proportion of air and vapor or gas to be burned around the outside of the cover.

Around the cylindrical chamber a casing is located, and the chamber is made with openings to permit a certain amount of air to pass up between the chamber and casing and direct the supply of air to the outside of the flame.

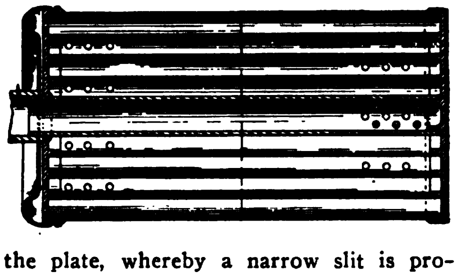
712,739. Electric Spark Generator.—Joshua Struthers, of Des Moines, Iowa. November 4, 1902. Filed March 10, 1902.

Relates to a friction governor. The armature is built upon a shaft driven by friction from some moving part of the engine. At the commutator end of the machine a collar is fixed to the shaft, and to this collar are pivoted levers or bell cranks provided at the end of one of their arms with balls, forming a centrifugal governor. When the balls are forced outwardly they cause two radial disks to be pressed in contact with each other, one of which is fixed to the shaft and the other is free to rotate upon the shaft. The last named disk bears against a cone shaped block, which is free to move longitudinally upon the shaft, and which encloses a coiled spring. The point of the cone shaped block bears against a stop on a lever pivoted to a pedestal rising from the base. To the outer end of this lever is fastened a link controlling an electric switch.

When the speed of the shaft becomes excessive the stop is forced outward by the outward motion of the balls. This will short circuit the generator and prevents its burning out.

712,791. Muffler for Internal Combustion Engines.—Carl O. Hedstrom, of Portland, Conn. November 4, 1902. Filed October 28, 1901.

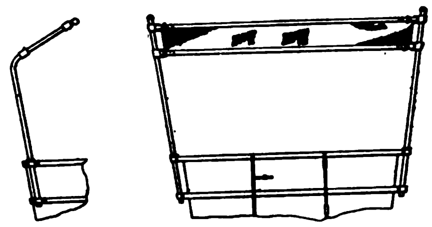
A muffler of any of the usual types, in which the gases are discharged in a direction parallel with the muffler, is provided over its discharge end with a circular plate with a chambered portion located immediately over the discharge ports, the inner edge of the plate lying parallel with the surface of the end of the muffler to which the plate is attached and at some distance from



the plate, whereby a narrow slit is provided through which the gases after entering the chamber may escape at all points. Assuming that the discharge into the chamber is uniform, the final escape of the gases through the slit will be in converging lines, which in their counteracting effect will tend to neutralize what little expansive force remains in the gases.

712,825. Motor Car or Other Vehicle.—James F. Mason, of London, England. November 4, 1902. Filed July 29, 1902.

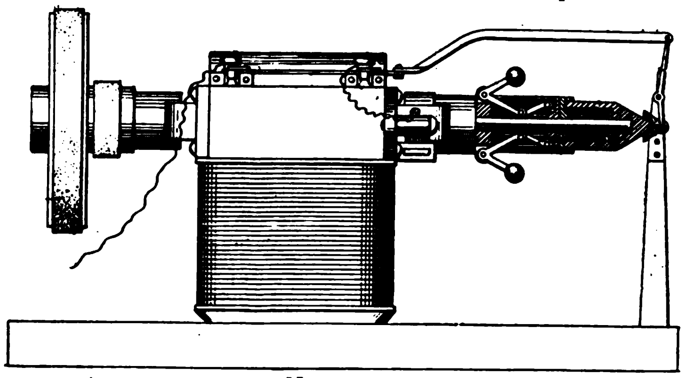
Relates to a dust shield for automobiles. Two stanchions are supported in



clamps at the two back corners of the vehicle. These have upper portions projecting forward at an angle of about 45°. A screen of waterproof canvas is stretched between these inclined portions by means of straps, preferably taking through eyelets in the stanchions. A screen of about 15 to 18 inches broad is quite sufficient. The height above the vehicle at which the screen or inclined plane is supported depends on the height of the vehicle above the road and the angle at which the screen is set. Instead of waterproof canvas a transparent material of the character of celluloid might be employed, although the screen can be put at such a height that it does not really obstruct the view. As the vehicle travels through the air at a high speed the air striking the under side of the inclined screen is directed downward over the back end of the vehicle, meets the upward current of dust laden air, and prevents the ingress of the same, which would otherwise take place.

712,316. Electric Accumulator.—F. Loppé, H. P. Morin, G. J. A. Griner and D. P. Martin, of Paris, France. October 28, 1902. Filed October 26, 1899.

This accumulator is formed of plates of lead or lead alloy, the positive and negative electrodes being similarly constituted. The sheets are fluted and perforated, and present the appearance of a nutmeg grater. They may be woven out of wire cloth. The coating of the sheets is an active ma-



No. 712,739.

terial, such as oxide of lead, lead salts, pulverulent lead, etc.

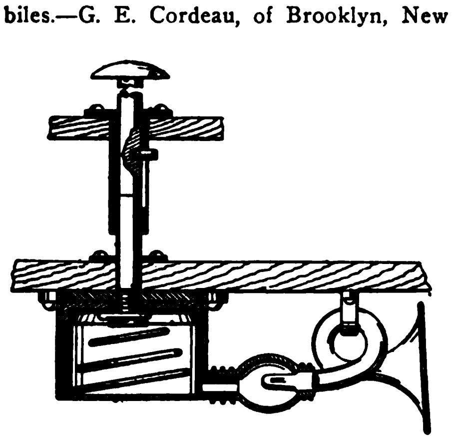
711,997. Process of Forming Electric Accumulators.—William Morrison, of Chicago, Ill. October 28, 1902. Filed March 18, 1901.

The object of the invention is to provide a process whereby metallic lead structures which are designed to ultimately become the active elements of a storage battery cell may be quickly disintegrated to the desired degree as a step precedent to the formation of the usual active material.

711,937. Change Speed Gearing.—O. M. Carman, of Indianapolis, Ind. October 28, 1902. Filed February 8, 1902.

The invention relates to speed gears with individual clutches, which are engaged by toggle levers. The latter are actuated by a tapered rod by means of short pins, which project through the hollow shaft.

711,940. Pneumatic Alarm for Automobiles.—G. E. Cordeau, of Brooklyn, New



York. October 28, 1902. Filed October 30, 1901.

The invention relates to horns which are equipped with a piston for blowing them. A pedal which is secured to the piston rod projects through the footboard. The piston, which is composed of a leather cup, is held between two metal washers and secured to the push rod by a nut. A rubber bulb is secured to the cylinder at one end and a horn at the other. Inside of the bulb is the tongue of the horn, which has a vibrating reed.

No. 712,196. Motor Vehicle.—W. J. & G. Lane, of Poughkeepsie, N. Y. October 28, 1902. Filed March 8, 1902.

The invention relates to a method of taking up the slack in the driving chain of a steam carriage by shifting the rear springs backward. The engine can then be rigidly secured to the frame of the vehicle and flexible tubing is dispensed with.

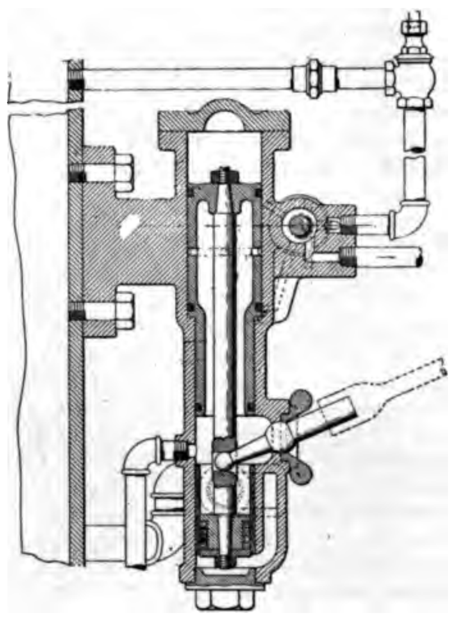
712,171. Valve Mechanism for Explosive Engines.—G. J. Altham, of Bristol, Mass. October 28, 1902. Filed January 3, 1900.

A piston valve is employed which controls the admission of the explosive charge to the working cylinder and also admits the compressed air which is blown through the engine after each working stroke.

712,186. Feed Water Regulator.—R. J. Flinn and G. P. Aborn, of Boston, Mass. October 28, 1902. Filed September 11, 1901.

The invention has for its object to provide improved means for automatically regulating the performance of the pump in accordance with the height of the water in the boiler or other receptacle. The invention also relates to an improved boiler feed pump.

Inside of the boiler is an inclined pipe, which reaches down to the low water level.



Should the water in the boiler drop to that level, steam will flow through the pipe and actuate the pump. If the water level is higher than the orifice of the pipe it will rise in the latter and also actuate the pump. But since the ducts are very small, the water cannot flow through as rapidly as steam would, and the pump works at a much slower rate than it does when operated by steam. The feed pump is single acting and requires no stuffing box. On the up or suction stroke the steam presses against the annular shoulder under the steam piston proper and raises it. On the down stroke water is pumped to the boiler and the steam presses on the total area of the piston. To do away with a stuffing box the shank at the bottom of the piston is provided with a piston ring. The low water level can be regulated by turning the pipe in the boiler around its fulcrum.

712,829. Motor Vehicle.—John E. Millard, of Poughkeepsie, N. Y. November 4, 1902. Filed August 12, 1902.

Construction in a steam motor vehicle in which the generator, engine, water tank and fuel tank are mounted entirely on the running gear.

712,893. Combined Reversing Mechanism and Brake.—Jacob Baldwin, of Xenia, Ohio. November 4, 1902. Filed January 21, 1901.

712,906. Steam Engine Valve.—E. S. Chapell, of Dorchester, Mass. November 4, 1902. Filed March 24, 1902.

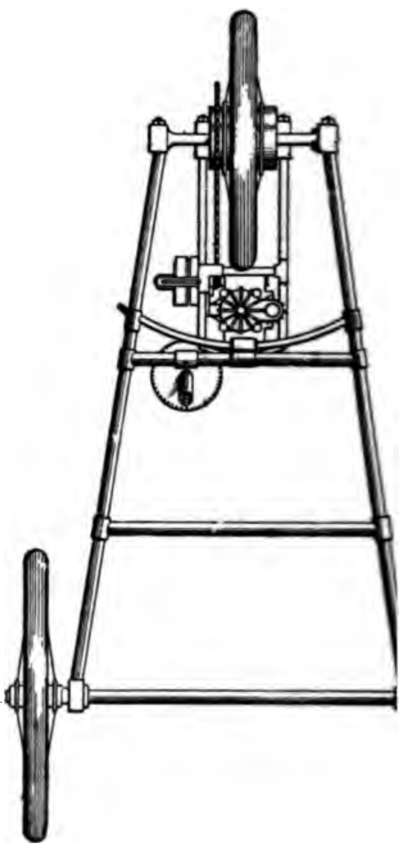
An oscillating valve for a steam engine consisting of a cylindrical casing prc with a steam port and an exhaust por a straight partition extending throug casing formed with a spiral flange e ing the length thereof and terminati each end on opposite sides of the st partition.

712,067. Explosive Engine.—C. E. I of Cambridge, England. October 28 Filed April 16, 1902.

The invention relates to balance gines in which there are two diamet opposed working cylinders, each of contains two pistons. All of the drive a single crank shaft.

712,001. Motor Vehicle.—A. E. Os of New York, N. Y. October 28, Filed January 9, 1902.

The invention relates to three wh gasoline vehicles, in which the front



acts as the driving and steering wheel. motor and mechanism are secured frame, which swings around the fulcru the front wheel.

All Steam Carriages
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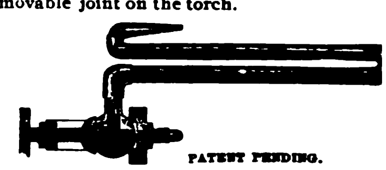

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ability Contest Discussion.

recent discussion at the club the A. C. A. some very practical is were made regarding rules ngements for future contests. ice, it is certainly very desirable scores of the contestants should l at each control, so that the :s may have authentic information the completion of each section ntest. If no official information out the reporters will obtain the . from the contestants, in which case the reports are not always as unbiased and reliable as might be desired; also, less prominence will be given the subject by the papers if the information obtainable is not official.

The idea of an exhibition after the completion of the contest is also an excellent one and has been introduced abroad with good results. It gives prospective purchasers an opportunity of examining the condition of the cars at the end of the contest and the contestants a chance of disposing of their contest vehicles, which in the case of manufacturers located at a considerable distance from New York and having no agency here would be of considerable importance, as it would save them the cost of transporting their vehicles back.

It will be observed that the discussion was not participated in by any of the manufacturers who were conspicuously successful in the recent trial. It is to be presumed that they considered the conditions satisfactory and had no suggestions to offer. It is perhaps natural that those who were less successful should favor some changes in the conditions in future trials; and it must, of course, be admitted that more severe trials would be advisable for the future. But there could be no graver mistake than to give up the endurance contest and substitute the road race (if such a thing were possible). For road races as carried out in Europe special machines are built at enormous cost. A large number of the vehicles are generally hopelessly wrecked, resulting in great financial loss, and while the few winning machines may fetch record prices (often from speculators, who later on find them "white elephants" on their hands), there is little demand for the unsuccessful racers. And after the race the interested public knows nothing about the commercial machines, for it is an impossibility from the performance of, say, a 60 horse power racer to draw definite conclusions regarding the qualities of a 6 horse power runabout or a 12 horse power touring car.

It would be particularly unwise to introduce the road race here at the very moment which seems to mark its decline and probable abandonment in France. The recent "Circuit de l'Herault," for instance, was essentially an endurance contest, as eight points were allowed for regularity of running, ten for fuel economy and only two for speed, the speed contest being held on a kilometre track. The French have apparently arrived at the point where they admit, as we have always contended, that pure speed contests are misleading to the public and lead inevitably to results harmful to the industry and the pastime alike.

It is urged that the public cannot understand a contest in which the first arrival is not the winner. This may be true of a certain class of the public, but we submit that it would be an extremely thankless task to organize a contest for the special benefit of this narrow brained class.

People on this side seem to be much impressed with the figures published after each great French race (always expressed in round millions), supposed to represent the sales which have resulted from the event. It should be borne in mind in this connection that "talk is cheap," especially among patrons of the races. The organizers of the great annual races may possibly flatter themselves that about all the sales effected during the year were a result of the event organized by them. But the conditions in this country prove that no road races are necessary to create and maintain an interest in automobiles. The annual production of automobiles at present is more than likely greater in the United States than in France in spite of the several years' lead which France enjoyed at the start. And the considerably higher prices of the French machines, re-

ferred to in another column, are in part the result of the enormous burden the continual road races place upon the French industry.

If we must have a more severe contest, let us have another contest to Buffalo with, say, an 18 mile limit; or a contest to Montreal, Chicago or St. Louis; but let us have a contest with official observers and one in which it is not necessary to violate or have suspended existing speed regulations. When it was suggested last winter that for the Boston contest the authorities might be induced to suspend the regulations, President Shattuck said with considerable emphasis that it was the policy of the Automobile Club to uphold and insure the observance of the law. This policy, we hope, will be continued by the club.

Another Speed Craze Fatality.

On October 25 an automobile accident occurred at Handcross, near Crawley, England, in which the professional driver lost his life and one of the passengers received serious internal injuries, while the second passenger, the owner of the car, escaped with slight injuries. The case deserves particular mention here for the reason that the owner of the car testified before the coroner who held the inquest regarding the death of the driver that just previous to the accident the vehicle had been proceeding at only about 7 miles an hour.

The accident occurred on a steep down grade. According to the testimony the hill had been ascended on the second speed, which would correspond to 18 miles an hour. The ignition had been cut off, however, before the top of the hill was reached and at the top the vehicle was running at only 7 miles an hour, which speed, witness thought, had not been exceeded in the descent, as the ignition remained cut out and the brake was applied. Suddenly the driver turned into the bank and the vehicle overturned, throwing the occupants out, the witness being projected 20 feet. Witness would not make any statement about the power of the car (which was of a well known French make), as he feared that prejudiced people might draw unreasonable deductions. He, however, gave the price he had paid for it, which leaves no doubt that the vehicle was of high horse power. Witness also said that it was his impression that the car turned one complete somersault, as it stood upright, with the front wheels off, after the accident.

The inference that a car can turn a complete somersault on the road and a passenger be projected 20 feet when the speed is only 7 miles per hour is calculated to convey false impressions as to the safety of automobiles and calls for strong refutation. Automobilists of experience need not be told that it is an impossibility for a person to be projected 20 feet when a car is running only 7 miles per hour. If a sudden stop occurs on a level road, it would require a speed of about 30 miles an hour to project a passenger 20 feet, and if the sudden stop occurred on a down grade of 15 per cent. a speed of about 20 miles would still be required. It may be that both the speed and the distance the witness was thrown were incorrectly estimated, but both cannot possibly be anywhere near correct.

The coroner's jury returned a verdict of accidental death, the accident resulting through the deceased inadvertently turning the car to the right. It will probably never be known what caused the driver to turn the car. As in some other accidents of a similar kind, speed may not have been the prime cause, but it was certainly the factor which determined its gravity.

Prices Here and Abroad.

It has recently been ascertained that in England cars of native construction sell at higher prices than cars of similar weight and power imported from France. Different reasons are ascribed for this by various authorities. Some assert, as does the *Daily Mail*, that the English manufacturers cannot produce as cheaply as their French rivals, owing to less perfect organization of their works and to the deficiencies of the English parts market which forces the English manufacturers to go abroad for many of the parts employed in the construction of their vehicles if they want them to be first class. Others, who take a more optimistic view, claim that the difference in prices in favor of the English products is simply a sign that the latter are of a higher quality and in consequence command a better price.

Whatever the correct reason may be, so long as the prices asked for vehicles of home production remain higher than those demanded for cars of foreign manufacture, England will remain a profitable field for the importation of automobiles from other countries and the English man can hardly hope to secure m outside their own country.

It would be interesting to ma parison of the prevailing prices can and European cars, as from conclusions might be drawn reg prospects of export in automol this country to various Europ tries in the future. In Englan stance, American automobiles have to compete particularly wi and Belgian machines. At pı value of automobile imports int from France is several times gr the value of imports from th States, but this may be due to th almost every manufacturer of a nence in France is represented land, while as yet only few manufacturers have agencies the

Of the automobiles imported i Britain during the month of 233 arriving from French ports clared at values averaging $1, seventy from American ports $862, and nineteen from Belg $1,054. It will thus be seen that age declared value of the Amer cles was only little over one-ha the French vehicles.

It should be mentioned in thi tion that among the vehicles from France were a considerabl of high power, which are natur expensive than low powered o the imports from America we confined to the lighter vehicles, popular with the general pu even after allowance is made higher average horse power of t machines, the American cars hc siderable advantage in the prices.

The generally excellent showi American cars in the recent E liability trials ought to improve ket for them in England. Besid be presumed that in future th for cars of medium weight and naturally increase, while the de the expensive racers will decline.

Motor Control by Ex Throttling.

A number of American man of gasoline motors have brough tem of control by throttling the charge to a high state of perfect motors are very flexible and ca

emely low minimum speeds, and trolling device is generally very On the other hand, it has been out by Captain Longridge, others, whose recent paper before titution of Mechanical Engineers being reprinted in our columns, haust throttling presents certain ges over throttling of the admis- Vhile we admit these advantages convinced that in other respects ge throttling system is superior, so s extremely doubtful whether the throttling system possesses a bal- advantages over that of charge g.

mportant difference between the ems is that with exhaust throttling ıpression in the cylinder remains , while with charge throttling it is From this difference result dif- in the fuel efficiency, the certainty on and in the quietness and stead- running at slow speeds. It is in of these points that exhaust throt- ıs the advantage. Higher com- generally results in better fuel ', and the advantage is particularly when compressions below the ıre considered. Experiments have hat when explosive mixtures are with considerable quantities of in- s combustion is retarded and the the explosion is greatly lowered s to say, the maximum pressure ıperature are much reduced, and ently there is less loss to the water

'hat is the relative effect of throt- the ignition in the two cases is a of conjecture. The inflammability ıarge decreases with the compres- d one would also consider it de- upon the purity of the charge, al- Captain Longridge denies this de- e, stating that the inflammability merely upon the proportion of ıpor in the charge.

e throttling undoubtedly admits of ninimum speeds than exhaust g. What limits this minimum is ow a certain speed the flywheel ım is insufficient to compress the The higher the compression the the momentum required to over- resistance, and consequently the he speed at which the momentum lywheel is still just sufficient to s the charge.

a low minimum speed is a valuable feature in automobile engines, and if accompanied by minimum noise and vibration it certainly overshadows in importance a gain of a few per cent. in fuel efficiency which might be secured by the exhaust throttling system.

Winter Use of Automobiles.

By A. L. Clough.

The commencement of settled cold weather is the signal for "turning out to grass" a very large proportion of all self propelled vehicles. Wheels are jacked up, tires deflated, tanks drawn off and a canvas cover drawn over the retired vehicle, not to be removed until the machine is ready for the spring overhauling.

A few doctors, an occasional enthusiastic layman and a stray delivery wagon seem to form the noble army of winter users. These people deserve credit, especially the doctors—for they are helping to create a public belief in the all the year round usefulness of the automobile. Physicians as a class can tell more in regard to cold weather troubles than any others. They drive their machines when they must, not when they choose, and if all their experiences were made known it would be the next best thing to a cold weather reliability run. There can be little doubt that the majority of machines are put out of commission during the winter from choice and not from necessity. The fact is that at present practically all automobiles are pleasure vehicles and there is no pleasure in automobile driving during the winter. If housed in heated stables one may say with confidence that almost all automobiles, particularly the gasoline machines, are capable of giving good service all winter in our cities. If one has no stable for his machine there will be much trouble experienced in connection with its use during the cold weather. His cylinder oil will assume the consistency of lard, everything will work stiffly, the carburetor will not work, and one will almost begin to doubt the explosiveness of gasoline mixtures. A gasoline automobile in an unheated stable has the redeeming feature of furnishing a splendid winter gymnasium where one may perform exercises with the crank, commencing with the relief cocks open and gradually working up to practice with full compression.

TECHNICAL DIFFICULTIES.

One may say that the technical difficulties of operating a motor vehicle during cold weather are four in number:

1. Difficulty of securing correct gasoline mixtures at low temperature.

2. Irregularities of lubrication due to increased viscosity of oils at low temperature.

3. Danger of freezing of pipes, jackets, tanks, etc.

4. The alleged increased tire troubles due to changes in resilient qualities of rubber when cold, and other causes.

CARBURATION.

The capacity of air for gasoline vapor at low temperature is quite small. The lower the temperature of the air the less gasoline it will hold, and a point is finally reached when it will absorb so little of the explosive as to render the mixture imperfectly combustible. When it is attempted to operate a gasoline engine at such a temperature it is found impossible to secure proper explosions. However, at almost all temperatures commonly met with in this climate, gasoline is sufficiently volatile to give practical results, especially if the air be heated artificially before entering the carburetor. Gasoline automobiles for winter use should have some provision for heating the air used in forming the explosive mixture. This is accomplished ordinarily by making use of the heat of the exhaust from the muffler. The air intake pipe may be jacketed by a portion of the hot gases escaping from the muffler or the vaporizing chamber may be jacketed in the same way. A carburetor so provided will furnish a proper mixture to its engine after it is fairly in operation. but it is sometimes a puzzle to secure the first explosion of a motor which is cold and taking air at a low temperature. It is obvious that the heat necessary to vaporize the gasoline for the first explosion must all come from the metal of the carburetor or from the surrounding air, and when both are in a cooled condition there is little tendency for a proper evaporation of the liquid which is chilled by contact with the cooled metal. After the carburetor does give a good mixture it may under some conditions of low temperature be condensed in the cold cylinder, and if the air happens to be warmer than the engine, moisture may be condensed upon the spark plugs and even affect the sparking. An engine which cannot be started on account of the cold can sometimes be made to operate by filling the water jacket with hot water and by pouring hot water over the carburetor, air inlet pipe and the mixture pipe or by laying cloths wrung out in hot water upon these parts. Such treatment is generally successful. After the carriage has been in operation for some time it may be left standing out of doors for a considerable period with the engine shut down and still no difficulty will be found at starting it up. If the water and the metal have been quite thoroughly heated up, they part with their heat quite slowly. Some people make it a point to use the very light grades of gasoline in the winter, as the high test liquids evaporate freely at a considerably lower temperature. One can say, in general, that there is no difficulty in keeping a gasoline engine which is suitably supplied with warmed air in continuous operation at any winter temperature, after it is once started, and that there is no difficulty in starting an engine, no matter how cold it may be, if the procedure recommended be followed. In starting from a warm stable

there is obviously no difficulty, and there should be no difficulty found in starting after a stop of any reasonable duration in the open air.

LUBRICATION.

There need be no very serious trouble in the lubrication of an automobile kept in a heated stable, because the machine starts out with its lubrication normal, and under all ordinary conditions the heat developed by the engine prevents the chilling and stiffening of the lubricants. With the mechanical lubricators now so much used the thickening of the oil due to cold is of comparatively little moment, for about the same amount of lubricant is fed in a given time whether it is thick or thin. With the sight feed cups, however, the amount of oil flowing depends entirely upon its thickness. The automobilist who has no heated stable will have a sorry time with his cylinder lubrication. The oil in the various bearings will be so thick that the engine will turn over with difficulty, the oil in the engine base will be about like good vaseline, and the cylinder oil cups if adjusted to feed properly in their cold condition will flood the cylinder when the engine becomes warmed up. It has been recommended that a quantity of kerosene be mixed with the cylinder oil in the winter, sufficient to give it the requisite fluidity, and although the writer has not tried this, there would seem to be no reason why it should not prove effective. Cylinder oil is certainly soluble in kerosene. On the whole, it may be said that an automobile equipped with a system of forced lubrication, if kept in a heated stable (which is the sine qua non of the winter use of automobiles) and oils of the proper character are made use of, there should be no serious troubles with lubrication.

ANTI-FREEZE SOLUTION.

The season has nearly arrived when the users of gasoline machines are preparing to substitute for the cooling water in their tanks some anti-freeze solution, but there will probably be some unfortunate and belated individuals who will neglect this until on some sharp night their radiators freeze and crack, or—what is infinitely worse—the water in the engine jacket freezes and splits the cylinder casting, necessitating an expensive renewal of the injured part. Fortunately we have means to make Jack Frost a harmless foe as far as the cooling systems of gasoline automobiles are concerned. Anti-freeze solutions are cheap and absolutely effective. It was the writer's good fortune to be the first to suggest the use of calcium chloride solution for this purpose, and as far as can be learned this solution is proving to be all that was claimed for it, when properly made up. Calcium chloride is a cheap chemical product, but it is quite variable in respect to the amount of water of crystallization which it contains and also somewhat variable as to its neutr and it is thus a little hard to tell what one is getting when calcium chloride is called for at the chemist's. It is plain from accounts which have been published that some so called chemists are unscrupulous or ignorant enough to deceive their customers into taking chloride of lime instead of chloride of calcium—two compounds which are hardly more alike than chalk and cheese. Calcium chloride is generally marketed in the form of the fused salt and is of a dirty white color, with a fracture somewhat resembling marble. It is generally very moist and covered with its own saturated solution. For automobile purposes it should be slightly alkaline. A correspondent in these columns recently made the statement that his sample of calcium chloride would turn red litmus paper blue, and blue litmus paper red. This is most remarkable, and it would seem that there must have been some mistake. If the calcium chloride be slightly alkaline, as it should be, there will be no danger of the corrosion of the metals with which it comes in contact. Just how much of the salt should be used per gallon of the cooling water depends upon the amount of water of crystallization that the particular grade of chloride contains. The probable amount required will be from three to five pounds per gallon, but one may have to do some experimenting on his own account unless the quality of the salt which he has be exactly known. While there may be no fear of corrosion when the salt is properly used, it is possible that some trouble may be experienced in the lubrication of the circulating pump when calcium chloride is used. If the lubricant employed be animal oil or grease and the cooling solution can come in contact with it, the result will be a formation of a lime soap which will destroy the lubrication. If graphite or other purely mineral substance be used for the lubricant, there should be no trouble from this source. It would be for the benefit of all concerned if we could get the experiences of a great many users of calcium chloride cooling solution. This solution is now being sold by several of the large chemical works and it is recommended that it be purchased of them, as they know its characteristics in respect to neutrality and the quantity required per gallon of water. If this solution is used, a gasoline automobile may be left out of doors indefinitely in any temperature which occurs in this climate, without the least injury. The users of steam vehicles are not so fortunate in regard to immunity from danger of freezing during the intense cold. Wrapping of pipes is of some avail, but the problem is far from being solved.

FROST AND TIRES.

There is a generally credited belief that rubber is more subject to deterioration when used in cold weather than in warm. Probably this is true, but one would like to know upon just what experimental data ·f rests. One thing is certain, that the frozen ground upon wl are required to run during the w son brings about very excessive run over country roads with the ruts is equivalent in point of tire many times the same distance d summer season. If much spee tempted it is at the almost total of the tires, especially if the mac heavy one. We have altogether data upon all phases of the wint automobiles, but it is especially relation to the tire problem.

When we have that "cold we liability test" some of these dout ters will be cleared up, but not u it is feared.

Suggestions for Future Co

BY C. C. BRAMWELL.

(Continued.)

The second point that futur committees of the Automobile America should consider, in arra liability runs, is some means the vehicles have a prearranged leaving the morning and noon In other words, the advertising arriving at a control first is th much of by the contestants that fort is made to be No. 1 at the It is evident that if nearly all th are easily capable of attaining t mum allowable speed the firs to leave the starting point of th be the first one home, on each day, supposing, of course, a non-

In the English reliability run, vehicle to arrive was the first This is hardly fair, because the chine has many advantages over It is, for instance, not bothered bly by dust, it is not stopped on by other vehicles being stalle further has a good chance to which is no mean advantage Further, if it can keep its first its reliability, it gets all the glor vertising due to this position.

In talking over this point w interested we mutually agreed only feasible method of arran matter equitably to all is to ha contestants meet each night and by ballot for position at the st of the morrow. At noon con could leave in the order of a ruling something like the abo stop all the nonsense that was each morning during the late ru

Surely the intent of the rules cent contest was that the vehic be attended to in the garage morning, and that they should garage when ready to proceed o Had a definite position in the st been assigned ahead for each v repairing, oiling, etc., would b done in the garage as intende was, the chief object of the c

was to be the first to start, with the result that a foolish stampede took place each morning for first position.

To look at the matter seriously, it seems a great mistake that the contestants, observers and mechanics were not allowed in the garage until 7 o'clock and not allowed to depart with the vehicle until 8:30. This would keep the repairing and oiling out of sight, and the operators, observers, mechanics and vehicles could go out on the street looking neat and clean (assuming facilities for washing and brushing up were provided at the garage as they should be). Another point, the street, instead of being blocked for two hours, would only be blocked for half an hour.

In advocating that the oiling up, cleaning and repairing of automobiles on such occasions as the late Reliability Run should be done out of sight, I do not mean that any deception should be practiced on the public. A careful record of everything done to the machine should be kept and published.

There is nevertheless no reason why all the unpleasant side of automobiling should be advertised on the public street. We all know that horses have to be cleaned, fed and curried each morning, but if a coaching party consisting of seventy vehicles should go from New York to Boston, does anyone think the horses and vehicles would be lined up on the public street to be fed, curried and cleaned?

Once more let me say that giving each contestant his order of departure the night previous to each start would stop all this foolishness. Each one would be willing then to stay in the garage and prepare for the day's run, taking his prearranged position at departure. Another point, in such contests as this, where the maximum day's work was about 96 miles, is that all vehicles should be required to make the full day's run without replenishing, or at least replenishing their gasoline. To fill with water at the noon control is not very objectionable, but to fill with gasoline is.

There is one more point that should be considered in arranging future reliability runs, and that is the matter of depreciation of the vehicle. In the English test a body of eminent engineers overhauled the machines at the end of the run and deducted points for all signs of excessive wear. The best way of determining this question of wear would be to have sufficiently long tests to play out the weaklings. This seems impracticable, however, owing to the enormous cost of such an undertaking. A 500 mile test is good, to be sure, but an automobile must be good for many more miles than that to prove a profitable investment for any user, and yet a number of vehicles that I examined at or near the end of the reliability run showed such signs of wear that a large repair bill would be necessary before the machines would be good for many more miles. On the contrary, other vehicles seemed none the worse for the run and could apparently cover the same course many times before needing much of any repairing. Some means should be found of giving credit on this point. A hypothetical instance will make clear the necessity of providing some means in future contests by which endurance, as well as reliability, may be ascertained. Suppose A enters a vehicle made of cheap material, just slapped together. His price is low and his vehicle is capable of, perhaps, 600 or 700 miles without serious trouble. He enters the run and places an operator in charge of the machine who knows all its weaknesses. The machine makes, for 500 miles, a certain score, but is practically useless at the end of that time. B, on the other hand, enters a vehicle somewhat similar in design, but built and assembled with great care. This machine does not begin to show its superiority over the makeshift of A until more than 500 miles have been covered. If, however, a competent body of engineers (men above suspicion) were to examine the two vehicles entered by A and B respectively they would quickly see signs of premature decay in the one and evidence of longevity in the other. Such a body of men could assign marks for perfection of material and workmanship, that, when added to those of reliability, would approximately show to a prospective customer the actual utility of the various machines. Simple reliability for 500 miles does not show this by any means.

The Explosive Wave in Engine Cylinders.

By Chas. E. Lucke, M. S., Ph. D.

Observations extending over several years' experimental work have brought out the fact that at times and under circumstances not always easy to define there are produced in the cylinders of exploding engines pressures abnormally high. By abnormally high is meant pressures higher than would be produced by the simple combustion of the mixture in the same cylinder and such as are normally indicated on the diagram. These high pressures—often double what is usual and what the cylinder was designed to resist—are extremely dangerous in many cases, and burst cylinders, loose heads, shocks similar to water hammer in steam pipes may all find their causal origin in these momentary and perhaps accidental high pressures, which were not considered when the engine was designed. It is believed by the author that the cause of these high pressures is the production of the explosive wave reported by several observers in their researches on explosive mixtures; or, better, the explosive wave and the pressure are coexistent and are both caused and produced by certain conditions, some of which it is possible to define.

Messrs. Schloesing and De Mondésir long ago made some important experiments on the rate of propagation of inflammation through an explosive mixture. They noted that in mixtures in which the normal rate of propagation may be even quite slow there may result rates of propagation practically instantaneous—i. e., true explosions. The apparatus consisted of a long glass tube, open at one end and closed at the other. These true explosions occurred when at the moment of inflammation a strong interior agitation took place, such as results from projecting a jet of gas at high velocity into a mass of gas at rest. It was further shown that it is almost impossible to avoid, during the combustion of a mass of explosive gaseous mixture, the development of interior movements due to the combustion itself, and it is extremely difficult to observe the normal propagation, as there results so frequently an accelerated but irregular rate. The principal causes given are:

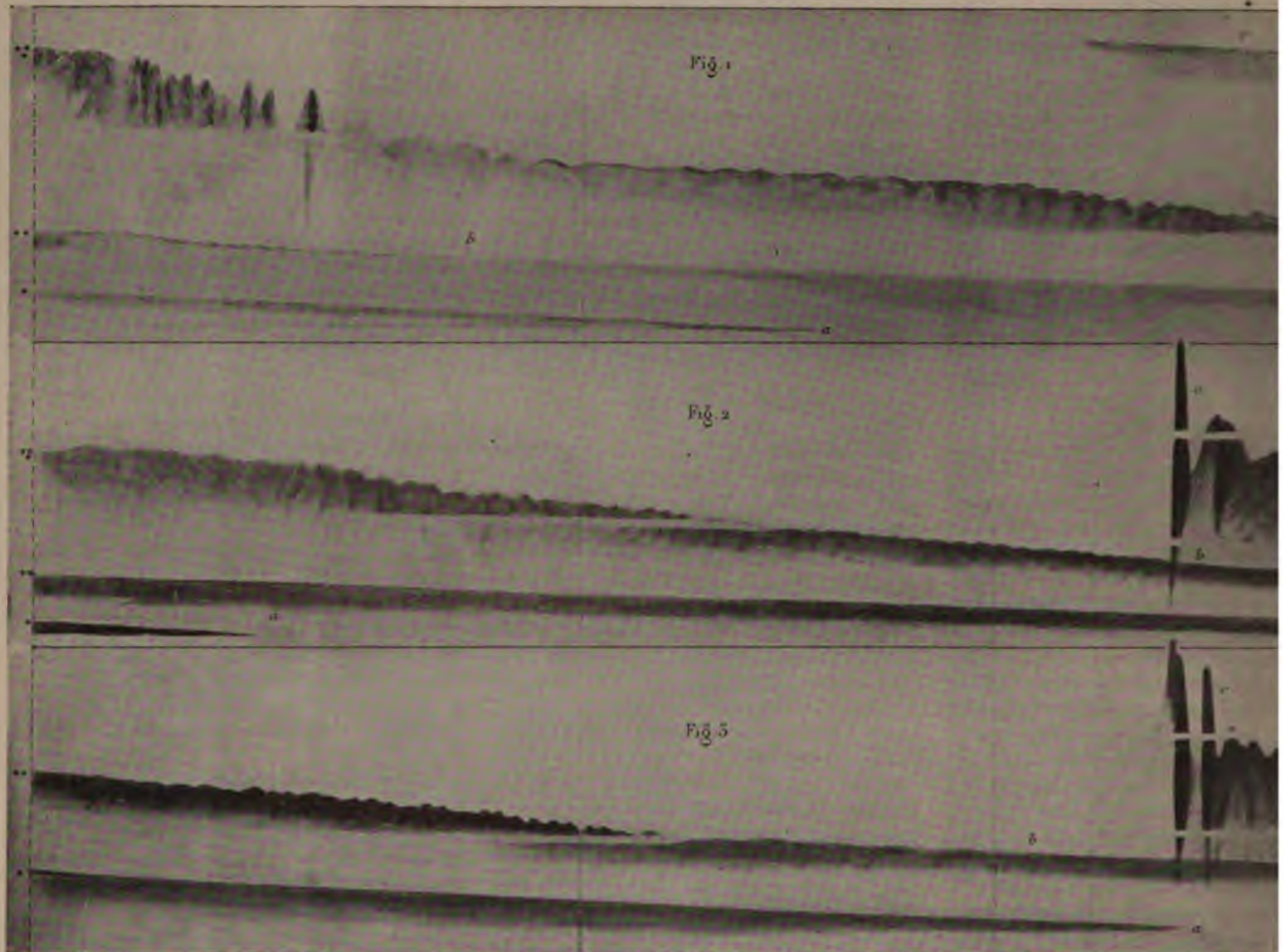
First—Difference in density due to difference in temperature of the gas. This effect cannot but be feeble.

Second—Expansion of burnt gases produced when the mixture is lighted at the closed end; the violent agitation results in a strong explosion, in which the normal rate may easily find itself increased 100 times.

Third—Vibratory movements, which always develop when a gaseous mixture burns, are the most frequent cause of flame acceleration, but the effect thus produced is variable from point to point and in successive experiments.

Messrs. Berthelot and Vieille in some similar work noted that under certain circumstances inflammation can propagate itself with enormous velocity. They have given to this mode of propagation the name "explosive wave." They recognize that the laws of the propagation of this wave must be the same as those of sound or any other impulse through the gas, and the velocity is independent of the pressure. In the act of explosion a certain number of gas molecules among those forming the inflamed layer are suddenly projected forward with a velocity corresponding to the maximum temperature developed by the chemical combination, and their impact determines the propagation in the next layer, the movement being reproduced from layer to layer.

Messrs. Mallard and Le Chatelier have made the most careful study of this phenomenon. They used a tube open at one end and closed at the other, and to record the progress of the flame a photographic apparatus was devised and constructed. The flame was found to advance with a very regular movement when started at the open end and allowed to travel toward the closed end. Following this regular movement are others of different characteristics, and there are in reality four phases to the complete combustion of the tube full of mixture, though in general these are not all produced in one experiment. The flame always advances at the start with a uniform movement, which is indi-



cated on the photographs by a portion of curve perfectly rectilinear, *a-b*, Figs. 1, 2, 3. The speed of this movement is the normal rate of propagation of the flame. This uniform movement is soon transformed into a vibratory movement, the velocity of which is always irregular and very much more rapid, showing in the sinusoidal curve *b* to *c*, Figs. 1, 2, 3. These curves usually extend to the end of the combustion. In certain cases, however, they transform into the explosive wave, of which Messrs. Berthelot and Vieille first proved the existence. This third phase is recognized by the violence of the explosion which accompanies it, and by the unusual brightness of the flame. The photographic curve rises quickly along an ordinate at *c*, Fig. 2, showing thus that the propagation of this wave required an extremely short time. Finally, as a fourth and last phase, the flame may become spontaneously extinguished before the complete combustion of the mixture, as at *c*, Fig. 4.

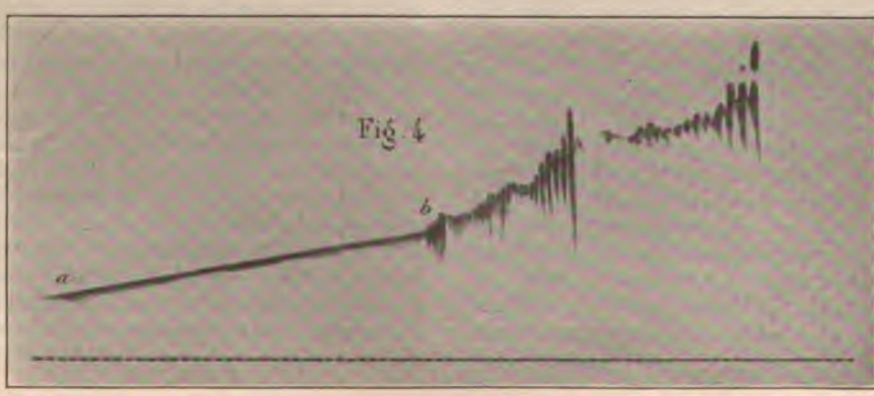
The development of the vibratory movement is always accompanied by sound, and at the same time the flame, which before showed as a thin, brilliant surface, becomes all at once agitated and extends out to a thickness of a decimeter or more. The sinusoidal curve is often made up of several curves superimposed, and though often of different periods they are always multiples of one another. The velocity of translation of the vibratory movement is always greater than that of the unifor ment (about twenty times).

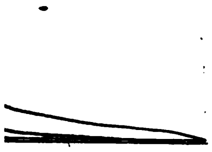
The production of the explo resulted in velocities of transla much greater than the registerin tus could record, exceeding some of metres per second. However portant fact was observed, viz., high velocity reaches a limiti which remains constant during t the movement and in successiv ments, and is the rate of propagat explosive wave.

Sometimes the explosive wa starts, and the vibratory mover tinues to the end, or having st cease and be succeeded to the e vibratory movement.

The passage of the explosive w companied by enormous inst pressures. Glass tubes, .002 met were always pulverized for th length, having resisted previou pressures of a hundred atmospher

When developed in a funne projecting into water, the fu smashed, though there was a fre through the water offering no sistance than its own inertia. Th are entirely analogous to those by certain homologous solid or plosives, such as nitroglycerine These substances in combustion on free air enormous pressures





IG. 5.

FIG. 6—PREMATURE EXPLOSION.

There is no reason for this, except vibrations caused by the further compression which accelerates combustion provoked during the progress of compression. No wave whatever is traced by the indicator, although the rise to over 300 pounds takes place so rapidly. At the time of the pre-

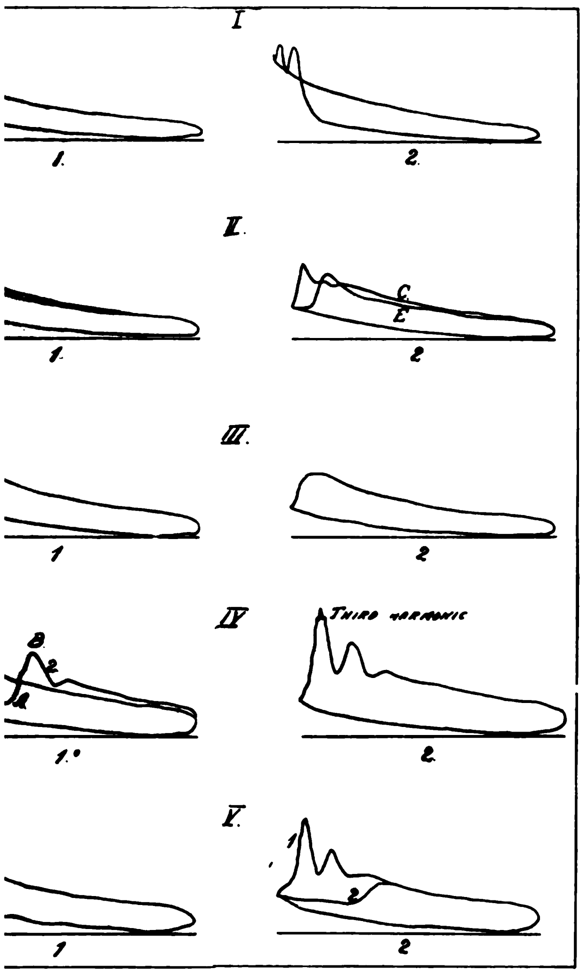
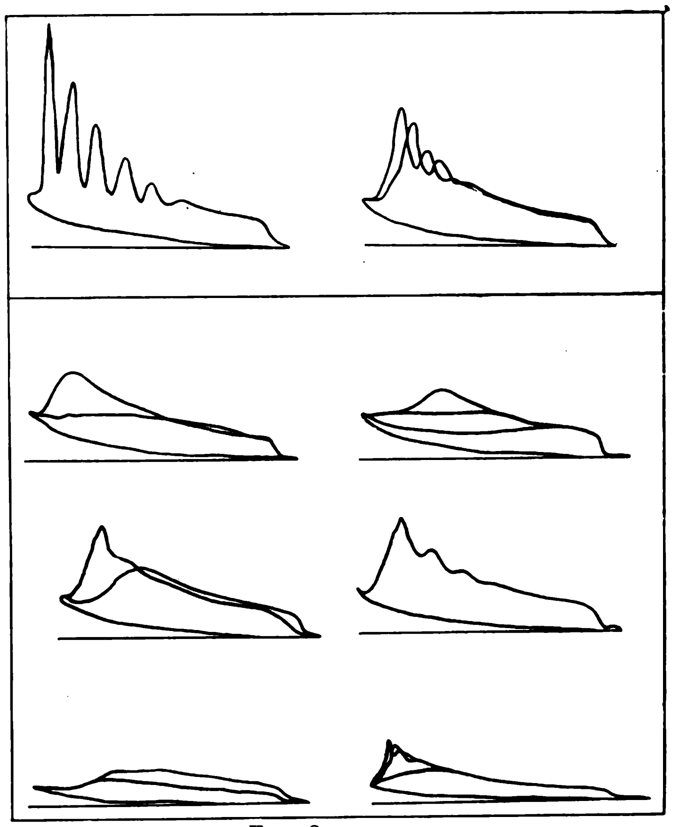


FIG. 7.



FIGS. 8 AND 9.

:hanical actions by the rapidity of ıbustion.

ightness of the flame during the of the explosive wave is much han during the normal propaga- extinction and cooling are also id. about five times.

scussion will serve to throw some the development of the abnormal in the engine cylinder, and will : possible causes of the develop- :he wave of pressures observed on cards taken at the same time. her conditions will appear in the ıf the observations that follow.

There is no doubt that though the sudden impulse given to the piston of the indicator may cause the spring to vibrate and the pencil oscillation resulting to record a wave, such movements as are about to be noted cannot be attributed to this spring action, as is so generally done.

Figs. 5 and 6 show pressures which resulted from the ignition of New York gas and air when the sparker was tripped with ¾ inch and 2½ inches lead respectively. In the case of preignition the pressure rises very much higher than in the case of proper ignition, being 320 pounds and 230 pounds above atmosphere respectively.

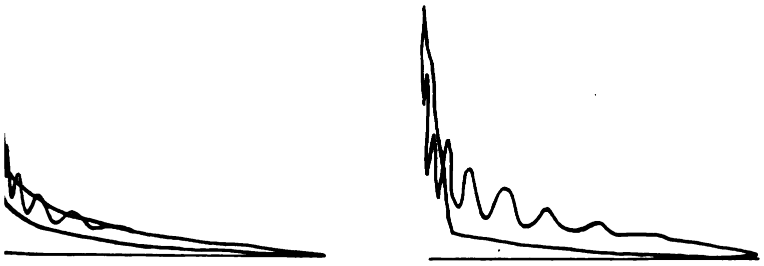
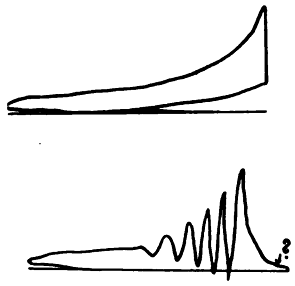


FIG. 10.

ignitions the engine thumped badly. We must conclude that in this case the normal rate of propagation was replaced by the higher one of the explosive wave, but was succeeded by no extended vibratory movement.

If there had been another mass in communication with the exploding mass, separated from it by a contraction, then we might have expected the succeeding long vibratory movement. This is the condition in the Hornsby oil engine, in which it is extremely easy to develop wave cards (Fig. 7) for any point of ignition These cards show the high pressures followed by a continued vibration during expansion, and in one case is noted a distinct third harmonic. All that is necessary to produce these waves is to have the mixture properly adjusted. The normal cards are also shown.

Fig. 8 shows a card from a different engine, with a maximum pressure of about 600 pounds per square inch above atmosphere, causing at the same time a most violent shock to the engine and causing it to nearly stop turning. The exact conditions surrounding the production of this card cannot be given; it was known that at the time the engine was moving very slowly, about 80 revolutions per minute, and the mixture had been undergoing



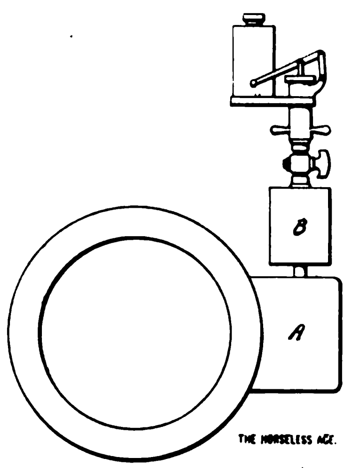
FIGS. 11 AND 12.

constant change. The engine was a 16 horse power, two cylinder, two stroke cycle gasoline engine, built for marine work. Fig. 9 shows some other waves and normal cards from the same engine.

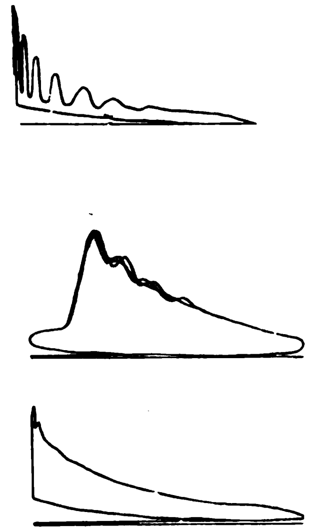
Fig. 10 shows two waves produced in a gas burning Otto engine when the charge was prematurely ignited by placing a piece of brick in the clearance space, one with engine running slowly, the other at normal speed.

Fig. 11 shows a card taken from a 35 horse power gas engine operating in New York. None of the conditions surrounding the production of this card can be given, as both before and after the normal cards of Fig. 12 were obtained. It seems, however, as if the inlet valve had stuck open momentarily, and the explosion caused it to close, producing the wave of increasing pressures.

The waves of Fig. 13 were always obtained, and the normal card impossible to obtain in the Otto engine when the addition to be described was made. To the ex-



haust valve chamber A was piped an auxiliary chamber B, on top of which was placed the indicator. Explosions in the cylinder must then be transmitted through spaces A and B before reaching the indicator, so that the conditions of continuation of vibratory pressures are provided with the view of proving these extended waves recorded by the indicator to be due not to spring vibrations, but to actually existing waves of pressure in the gas. As cards of the form of Fig. 12 were obtained before the additional chamber B was added, and cards of the form Fig. 13 after, it may be said conclusively that pressure waves



FIGS. 13, 14 AND 15.

did actually exist. The bearing of this on gas engine design is apparent. Cylinders must be built to withstand not the normal pressures alone, but the very much higher abnormal ones possible, and frequently found, and, secondly, to avoid continued vibration and exaggerated variation of pressure all division of the combustion chamber by passages must be avoided. Disregard of one or both of these rules will result in breakage, and possibly in loss of life from flying fragments. This statement is no exaggeration, for it has actually occurred at least once to the author's knowledge. It would seem after some little thought that the normal rate of propagation is really the most unusual in engine cylinders, for there are present conditions of high pressure, high temperature walls and inward projecting parts as well as real compression waves from the piston action. Moreover, normal propagation is always evidenced by a fine film of slight luminosity, whereas the explosive wave is evidenced by a sudden and more or less prolonged glare. This glare is what is always observed in cylinders, as was noted, among others, by Clerk.

As a further evidence of the presence of actual waves in common cards, such as Fig. 14, and to determine more clearly their period and form, the reducing motion was displaced so as to give the indicator drum some appreciable motion during the explosion, and so extend the surface over which the pressure rise is recorded. The result was as shown in Fig. 15.

It may be added in conclusion that these cards were all taken by the author with the same 240 pound Crosby spring, and it is believed that while spring vibration may and no doubt does enter, by no means can all these waves be so explained, particularly as the explosive wave, the actual existence of which is proved, finds in the cases cited at least some of the conditions necessary for its production.

Legislative and Legal issue of November 5, 1902. Price, 10 cents.

BEGINNERS PAGE.

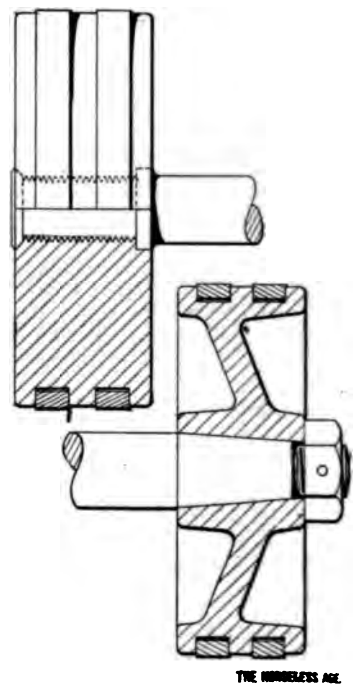
The Steam Engine.

(Continued.)

THE PISTON.

The engine pistons of the earlier steam carriages were simply cylindrical iron blocks or plungers, without any packing rings. Such pistons are, of course, not very satisfactory, for if the lubrication is deficient or if the piston has worn there is considerable leakage of steam and consequent loss of power. At present the pistons are generally fitted with one or two piston rings similar to those used on gasoline engine pistons and described under that heading.

Fig. 1 shows a simple construction of steam engine piston, half in section. The



FIGS. 1 AND 2—PISTON.

piston rod is provided with a collar sunk into the piston, and the rod is screwed through the piston and riveted over. The periphery of the piston is turned with two grooves in which the packing rings are placed.

In Fig. 2 is shown a different design of piston. In this case the piston rod is fitted into the piston with a taper point, which is screwed up with a nut. The piston itself, instead of being a cylindrical block, comprises a hub, a rim and a web, thus saving considerable weight.

Whenever, as in this case, the end surfaces of the piston are not plane surfaces, the inner surfaces of the cylinder heads must be made to fit closely to the piston surfaces, so that the space between piston and cylinder head when the former is at the end of its stroke may be a minimum. This space is called the clearance. A

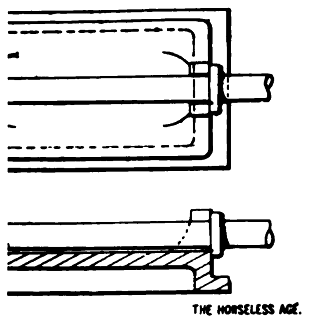


FIG. 3.

:arance than necessary results
: steam.

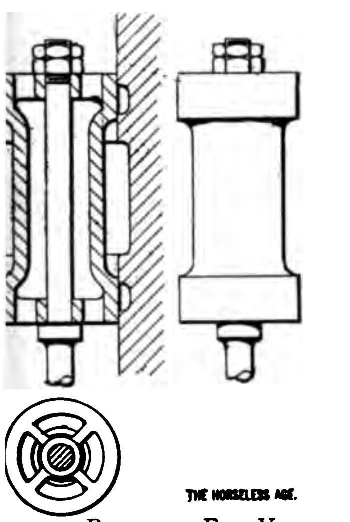
THE VALVES.

;t common form of valve used ·bile steam engines is the D of which a section and a plan in Fig. 3. This valve may be as a shallow rectangular iron h a rim around its top edge. hown the valve rod passes be- sets of opposite lugs on the he valve, being held against ıl movement with respect to the neans of a collar and a pair of some cases, instead of between rod passes through a hole on the back of the valve, being somewhat larger in di- an the valve rod. The surface ton which bears and slides on l surface in the valve chest is ıwn smoothly. The valve is ;ainst the planed surface in the ;t by the live steam pressure in :hest.

ometimes collects in the cylin- some means of relief must be o avoid accident. This form of :ves the pressure in the cylin- ıatically, as when the cylinder xceeds the valve chest pressure, ›f the valve is lifted from the :face and permits the escape of from the cylinder.

PISTON VALVES.

'antage of the slide valve is its its disadvantage the consider- ıf power by friction arising from



ECTION, PLAN AND END VIEW OF PISTON VALVE.

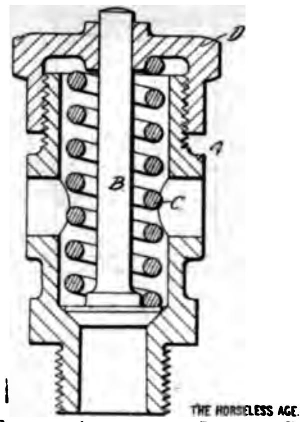


FIG. 5—AUTOMATIC RELIEF COCK.

the high pressure with which it bears against the sliding surface. This latter objectionable feature is overcome in the piston valve, an example of which is shown in Fig. 4. The figure shows a sectional view of the valve in the valve chest and an end and a side view of the valve.

The piston valve consists of a hollow metallic cylinder with a wide groove at the middle portion of its outer surface and an internal spider at each end for the reception of the valve rod. The hub of the spiders is drilled and the rod passes through these drill holes, being held in position by a collar and a nut and lock nut on the two ends respectively.

The valve moves in a cylindrical valve chamber, into which the steam and exhaust ports open at one side, shallow grooves extending all around the valve chamber where the ports open into it. The action is exactly the same as with the slide valve, except in the following respects:

The steam circulating freely through the valve, the latter is perfectly balanced; that is, the pressure between the valve surface and the valve chamber surface depends only upon the fit of the valve to the valve chamber, and is independent of the steam pressure. If water should accumulate in the cylinder, and in consequence the pressure in the cylinder rise above the steam pressure, it would not be automatically relieved, as the valve, being firmly held laterally, cannot possibly give. For this reason automatic relief cocks are always screwed into each end of each cylinder when piston valves are employed, through which any trapped water may escape.

In Fig. 4 the ports and the grooves by which they terminate in the valve chamber are shown as being cast. Now, for high steam economy and general satisfactory operation the width and location of the port openings must be very exact. It is well known that very accurate work cannot well be accomplished by casting, and for this reason the valve openings are often cast slightly larger, the valve chamber is bored larger in diameter than the valve and a steel tube valve liner is inserted in the valve chamber in which the port openings have previously been cut, which can, of course, be accomplished wtith great accuracy. This latter method is, in fact, the usual one in the construction of the small engines of pleasure carriages, if they have piston valves.

A peculiarity of piston valves is that by connecting the steam pipe to the exhaust port and opening the valve chamber to the atmosphere the engine is caused to run in the reverse direction. These changes can be accomplished by means of a single valve. The steam then enters through what is usually the exhaust port and leaves through the valve chamber. With a D slide valve this method of reversing the engine would not be practicable, as if live steam was admitted to the exhaust port its pressure would lift the valve off its seat.

AUTOMATIC RELIEF COCK.

Fig. 5 shows a form of automatic relief cock or valve. It consists of a strong walled nipple A threaded on the outside at both ends and provided with an outside hexagon part and openings through the walls at different points along its length. Within this nipple is located a conical valve B, having a suitable valve seat therein, against which it is pressed by the coiled spring C. The valve stem is guided by the cap D, which screws over the nipple at the outer end.

The nipple screws into the cylinder wall, and it will be understood that when the pressure against the valve from inside the cylinder exceeds the spring pressure on the valve, the latter opens and permits any water in the cylinder to escape by the openings in the wall of the nipple.

VALVE MOTION.

Sketches of Figs. 6, 7 and 8 have been prepared to explain the action of the valve in admitting and exhausting the steam to and from the cylinder respectively. It should be explained here that in the sketches the proportion of the width of valve face to width of port and the angular relation of crank and eccentric are not exactly as in actual engines. The relations here chosen admit of illustrating more plainly the principal function of the valve, and the conditions which determine the exact proportioning of the valve and ports and the relative angular position of crank and eccentric will be explained later on. For clearness the crank and eccentric are shown in a plane at right angles to those in which they are really located.

In Fig. 6 the piston P is shown at the highest point of its stroke. The crank C is then said to be in the inner dead centre position. The valve V is now at its centre position and covers both steam ports. This will be seen to correspond with the position of the eccentric E, which operates the valve, which is set at 90 degrees, or at right angles with the crank. Both crank and eccentric travel, of course, in the same direction (indicated by the arrow), as both are fast upon the crank shaft.

If now the crank and eccentric begin to move from the position and in the direction indicated, the piston starts on its

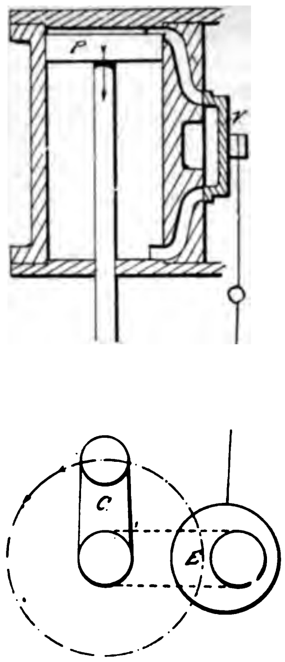


FIG. 6.
BEGINNING OF DOWNWARD STROKE.

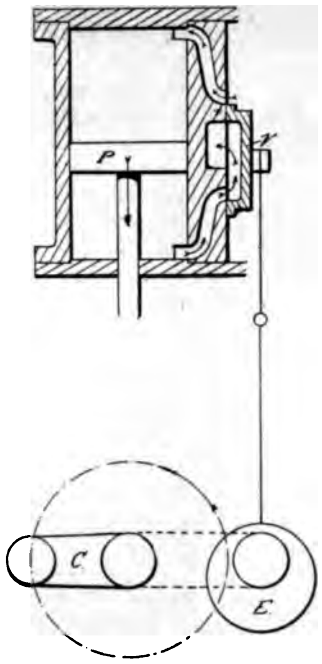


FIG. 7.
HALF STROKE DOWNWARD.

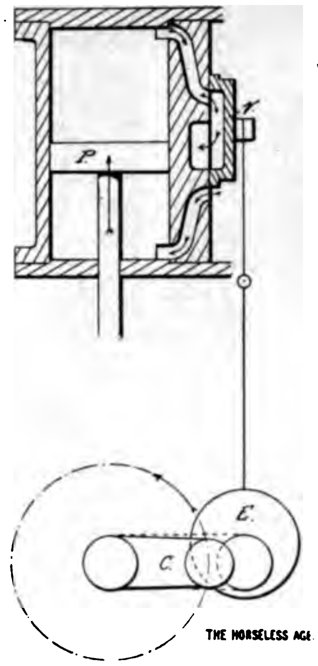


FIG. 8.
HALF STROKE UPWARD.

downward stroke and the valve continues its downward travel, as can be readily verified by means of the sketch. Immediately the valve will open the upper steam port to the steam chest and the lower steam port to the exhaust port. The result of this is the that live steam is admitted to the upper end of the cylinder and forces the piston downward, and at the same time the expanded steam is forced from the lower end of the cylinder out through the exhaust port.

This action is plainly indicated by the arrows in Fig. 7, where the piston is shown at a little over half stroke, the crank having traveled through a quarter revolution. The valve is now at the limit of its downward travel and both steam ports are full open, the upper one to the steam supply and the lower one to the exhaust. The centre of the eccentric disk is directly below the centre of the crank shaft.

Fig. 8 indicates the relative position of parts when the crank shaft has moved through another half revolution. The piston is now on the return stroke, which is about half completed. The valve is now at the limit of its upward travel and both steam ports are again fully open, but this time the lower one to the steam supply and the upper one to the exhaust. Consequently live steam now enters the lower end of the cylinder, forcing the piston upward, and the expanded steam leaves the upper end of the cylinder.

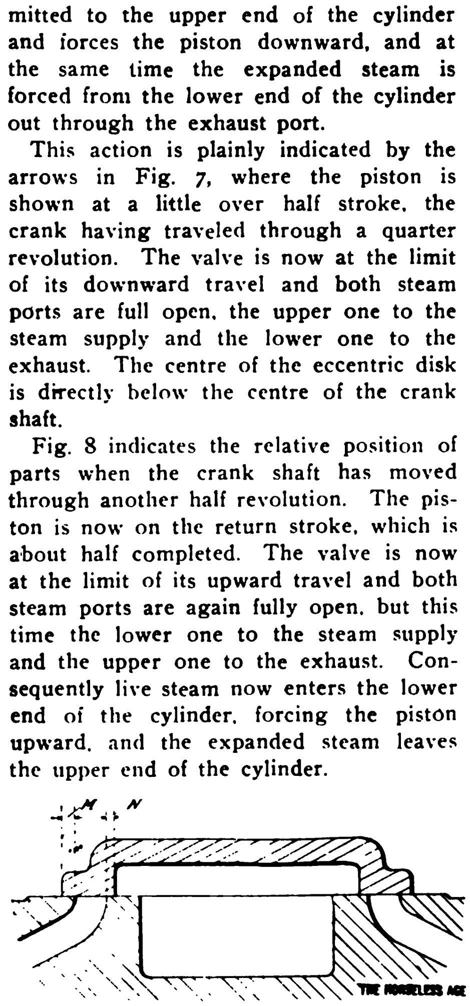


FIG. 9.

Between the positions shown in Figs. 7 and 8 the crank passes through the outer dead centre position, when the piston is at the lowest point of its stroke, the valve at the middle of its travel and both ports closed.

LAP AND LEAD.

In Figs. 6, 7 and 8 the valve face is shown as of the same width as the steam ports. An inherent disadvantage of this proportion would be that steam would be admitted to the cylinder during an entire piston stroke, which is, of course, undesirable, as it is much more economical of steam to cut off the supply at a fraction of the stroke and letting the steam in the cylinder expand till the end of the stroke. This may be accomplished by making the face of the valve wider than the width of the steam port, as shown in Fig. 9.

In this figure the valve is shown in its middle position. The valve face extends a distance M beyond the outer edge of the port; this distance is called the outside lap. It also extends a distance N beyond the inner edge of the port, this distance being called the inside lap.

It will be easily understood that with a valve with outside lap if the crank and eccentric were arranged relatively to each other as in Figs. 6, 7 and 8, so that the piston would be at the end of a stroke when the valve was in mid position, steam would only be admitted to the cylinder after the piston had accomplished a fraction of the stroke. When the piston started on the stroke the valve would still have to travel the distance of the outside lap before steam would begin to enter the cylinder. Now, steam should enter the cylinder as soon as the piston starts on a stroke, or even a moment earlier. This can be accomplished by moving the eccentric angularly with respect to the crank. Referring back to Fig. 6, it will be seen that by turning the eccentric in a left handed direction around its shaft the valve opening at the moment the piston is at the end or beginning of a stroke can be made anything desired. The amount of valve opening when the piston is at the end of its stroke is called the lead.

The inside lap affects only the time of opening and closing to the exhaust port. When a valve has outside lap the travel of the valve must be greater in proportion to the lap.

LESSONS OF THE ∴ ROAD ∴

The Difference Between Work and Play—Electric Experience.

BY ROBIN DAMON.

I have read with some interest the letters from your correspondents who tell how cheaply they can run automobiles. As a rule I notice that it is the beginners who expatiate so long and loudly over the small cost of running horseless carriages. And, also, I observe that the greater part of such experiences are with little steamers, weighing perhaps 600 pounds, and which are possibly run at a speed of 8 or 10 miles an hour for one or two hours once or twice a week. The work of automobiles under such circumstances is, of course, interesting, but when compared to real hard use, the cost, etc., is nothing by which intelligent comparison can be made between the expense of horseless carriages and those drawn by horses. I know of several owners of light weight automobiles who have gone through a summer without serious trouble, simply because they used the carriages very carefully and did not go out more than twice a week, taking trips of from 10 to 35 miles. Work of that kind is nothing to go by for the man who expects to run an automobile every day, as a horse is used. And therein is a portion of the public fooled. I will

TAKE AS AN INSTANCE

the recent letter of Dr. Kittredge. I know the doctor very well and he tells the truth about his experiences, yet in the face of the apparently successful use of his steam automobiles, I often see him with a horse. Another local physician who had used a horse bought a steam carriage and disposed of his old fashioned equipment. This was two months ago. His steam machine has averaged a visit a day to a machine shop, costing from $2 to $10 per visit. Now the doctor offers the machine for $250 and is looking for a horse. A young man of my acquaintance bought a second hand steam carriage because he could not afford to hire a horse with which to give his best girl rides. The first week the youth had a repair bill of $20, and then the machine needed a new chain and set of sprockets, costing about $50. He used

orth of gasoline one Sunday, : carriage is for sale. I know carriage that has had $75 spent summer, when the daily runs er 10 miles.

not think that I am citing ces because I have prejudices m machines. I use the ex-ly from the fact that they are ming under my observation, e few gasoline carriages used ion. I guess the record for owever, is no better than for have had some experience. delphia physician who figured him about 23 cents a mile for covered with his automobiles his estimates, and his experi-afe ones to form comparisons iguring on the cost of travel-id of a motor, if the machine d constantly for business pur-se who expect to get along eeks with a repair bill for y $4.25, as Dr. Kittredge did, y be disappointed. Personally ten times that sum in the past ires, to say nothing of other

ing with a veteran automobil-man who can and does take apart when repairs are neces-e said that after listening to a rs talking about their freedom e and low cost of operating, to believe "all men are liars." e could not reconcile his own and those of other folks as em. And I believe the same. e $4 to have one tire repaired ee how another automobile get the same job done for 50 so on.

ITEM OF COST UNCERTAIN.

ore than once written that I omobiles, and that I thought bright future, but I do not achines now in use, or to be of the factories next year and er, are the kind that statistics ned from that will be of any class of men who always want hat it will cost" to operate an No man can say what the n automobile will be. It may $500 accident the first minute it might puncture all the tires trial. And, again, a carriage sed a season with only trifling led. Such a machine would be the miracles, perhaps.

pective purchaser of an auto-t trust himself to the hands of after using all the care possi-ing a carriage and in using it. happen they must be repaired ner will have to pay the bill, ge or small—and it is not usu-er. In the present stage of the wner of an automobile who ex-: it cannot calculate closely on here may be a few people with excellent luck who get along with trifling expense, but they are remarkable exceptions and cannot be looked upon as examples likely to be the lot of ordinary folks. I might perhaps add truthful folks.

I have had automobiles three years and my stable now has two run by gasoline, a steamer and an electric runabout. It seems as though I should be able to speak on the subject with fully as much intelligence as do those men who have run a $600 steam machine a few weeks, and immediately prepare a table of their expenses, with elaborate comparisons on the cost of keeping horses. I have had three and four horses many years, and without going into details I can state that the expense of keeping up the equine part of my stable is but a mere bagatelle when compared to the bills caused by the automobiles I use.

ELECTRIC EXPERIENCE.

The electric carriage is my latest purchase. It is a runabout, and I have had it two months—not long enough to form a reliable opinion about the expense of maintaining the machine, but the time the carriage has been run is sufficient to at least allow it to stand for the same period. The electric is handy for running about town with, and I have gone on 40 mile trips and returned all right. I have a generator in the stable run by an electric motor, so that the battery can be kept charged all the time. In the two months I have had the electric the carriage has been in constant use, often going out four and five times a day, and it is always ready for use—like a horse. The only bother has been with the tires, which have been punctured several times. The tire cost for two months has been $47, of which $37 was for two new tires and extra inner tubes. Probably the tires now on hand will last a year at least. The second time the battery was charged it was taken to an electric light station, where the man in charge must have turned on about 5,000 volts, for he heated the cells so hot that the sealing wax was melted and the liquid boiled away. One cell was cracked, but that was replaced, and the battery did not appear to be damaged any by the tough experience. Anyway, it has run all right.

Aside from the tire bill, the cost of operating the electric machinery has been about $8 a month for the power used in charging the battery. The only work required has been to put a little water into the cells about once in two weeks.

I removed the cells this week, and one was opened to see how the plates were doing. There was not the slightest trace of trouble, even though they had been subjected to daily use, and the first charging was of a severe nature.

I do not think any owner of a gasoline or steam carriage can say that he used his machine two months without having machinists afoul of the interior, with a bill for repairs. Possibly the future of my electric may be costly, but at present it is the pride of the stable from the fact that it is always "on deck."

I am not a particularly ardent advocate of electricity, but, so far as my experience goes, the light carriages will certainly do a lot of work in a day if kept charged. They beat anything I have ever seen for running around the city, because they start with one movement, make no noise or smell and run smoothly. People tell me that in three months I will have to get a new set of batteries, yet so far there seems to be no indication of such a calamity.

One argument against electricity is that they run slowly. Yet mine, with thirty cells, giving 60 volts at the start, will go at an average rate of 14 miles an hour over country roads, up hill and down. I find that there are long distances where no power is needed, as the carriage runs so easily that it will go rapidly down grade. This of course saves the power, thus increasing the mileage capacity. I have run a half mile on a level road in ninety-five seconds, and that is as fast as I want to go in a light carriage. So far as I can see the speed is sufficient for the average person, and especially ladies. My carriage is mostly run under the direction of female hands—hands that never dared to handle either a steamer or gasoline machine.

I now use the electric carriage when going out evenings, as with a top it gives perfect protection from rain and wind. Where formerly I had to have a man drive a horse and sit up late at night, now the electric is run into a corner and left standing until I am ready to return home. Of course, I might have used the gasoline machines the same way, but somehow I do not like to run them when I have on my good clothes in the evening, for a detached wire, loose bolt or something may make it necessary to explore the interior —and that is a dirty operation. The electric is clean, with no mechanism to get out of order, and if it is charged will come home if in condition to leave the stable. If I want to go off 10 or 20 miles into the country I generally use a gasoline carriage, but even these trips might be made with the electric if care was used in running. Altogether, I think the electric power is the neatest and cleanest of the three now used on automobiles, and if used within its limits it appears to be as satisfactory as any of the other two.

THAT CHAIN REPAIR.

Just to show that I have some knowledge of an automobile I want to tell "R. W. B.," who criticised my method of putting on a chain, that gasoline carriages are not fitted with a bicycle chain that can be put together with the fingers of one hand. Instead, a big, heavy affair is employed, strong enough to drive a ton weight. There are no coupling links on mine, and the only way to get it together is to pound the rivets when the chain is on the sprockets. When "R. W. B." has run an automobile years instead of months he will have more knowledge of things.

...OUR... FOREIGN EXCHANGES

The New Six Horse Power De Dion Carriage.

The De Dion & Bouton firm, of Paris, has recently brought out a 6 horse power voiturette which, as already reported, is to be manufactured in large numbers and sold at a low price the coming season. The motor has a bore of 90 millimetres and a stroke of 110 millimetres (3.8x4.2 inches) and runs normally at 1,550 revolutions per minute. The ignition is by the well known De Dion system, with mechanical trembler, an improvement being that the rotating part of the trembler which was formerly of fibre or ebonite is now metallic and is therefore grounded. The exhaust of the motor is regulated by the usual mechanism, which can be operated by either a pedal or a small hand lever. The cooling is effected with 12 litres (a little over 3 gallons) of water carried in a tank fixed to the dashboard. A radiator is placed in front.

A longitudinal shaft passes from the motor to the gear case located toward the rear of the chassis. This shaft has a squared joint with the change gear shaft, and may therefore shorten or lengthen out without straining any part or causing unnecessary friction.

The change gear gives two forward speeds only and is enclosed with the rear axle differential gear in a single moisture and dust proof aluminum casing. The gear comprises two parallel shafts, one above the other, the upper one receiving motion direct from the motor and the lower one being provided with a bevel pinion which is in mesh with the bevel gear crown on the differential gear. The upper shaft carries two spur pinions keyed to it and the lower shaft two spur wheels loose upon the shaft, which are constantly in mesh with the two pinions respectively. The two loose gears are clutched to the shaft, one at a time, by means of the well known De Dion friction clutches operated by means of a rack passing through the hollow shaft. The change gear shafts have ball bearings; in fact, all the bearings of the vehicle, except those of the wheels, are ball bearings, but only two sizes are employed to facilitate renewal. The wheel bearings are plain and are lubricated with grease. The rear axle construction comprises the usual De Dion axle parts, universal joints and hollow spindles.

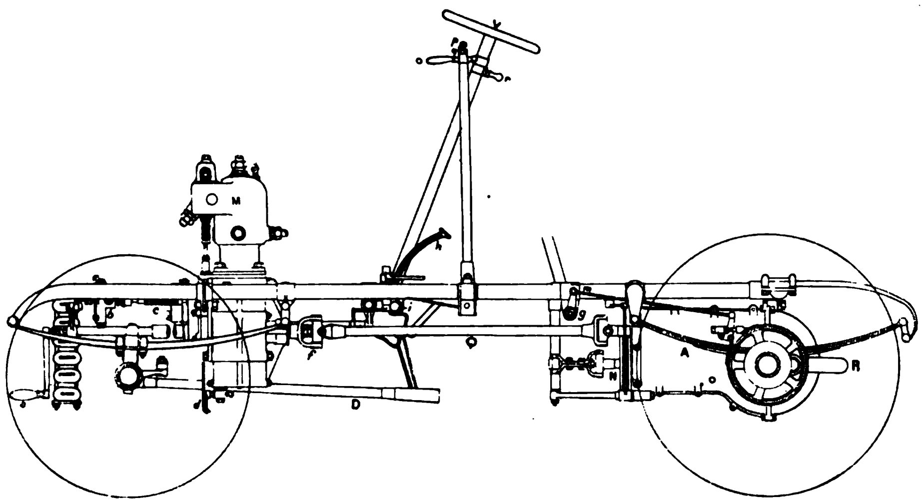


FIG 1.

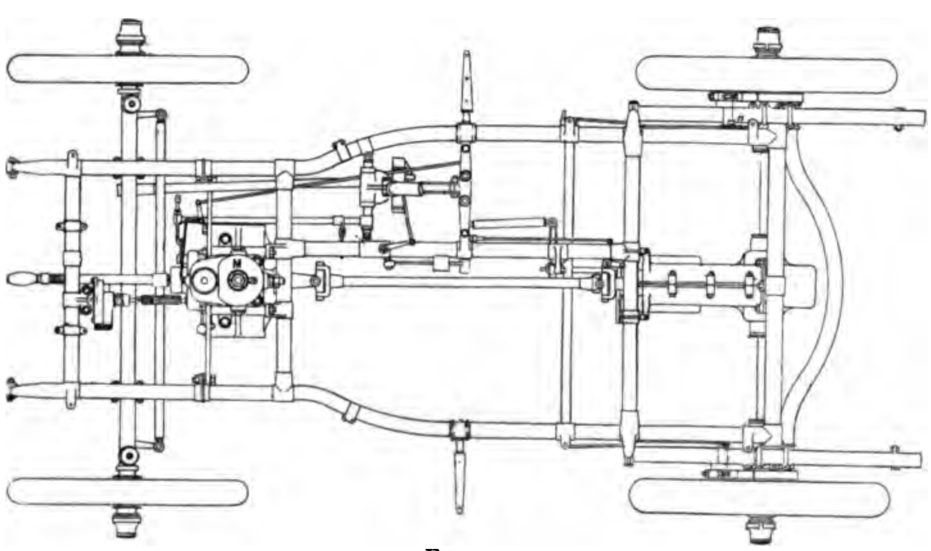


FIG. 2.

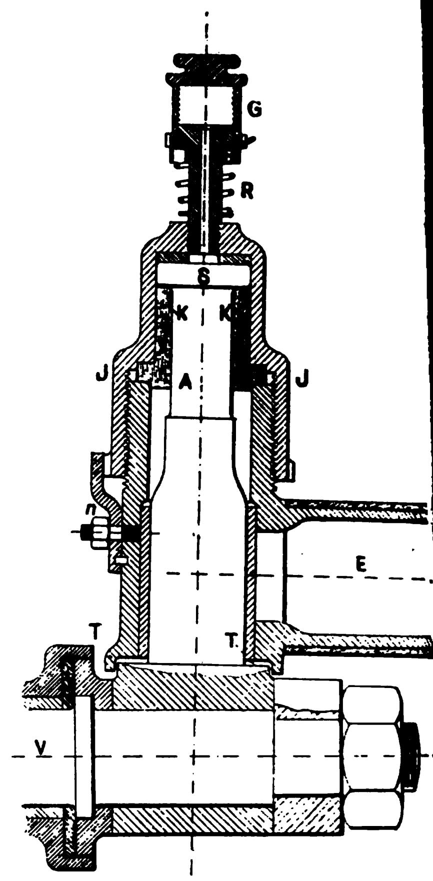


FIG. 3.

The weight of this vehicle complete is 750 pounds. The maximum speed is claimed to be 28 miles per hour. Steering is by means of an inclined hand wheel with a worm and wheel irreversible mechanism.

The operating mechanism comprises the following parts: To the left and below the steering wheel the clutch lever which gives the high speed when pushed forward; to the right and under the steering hand wheel, a small lever *p* for controlling the ignition and another *q* for adjusting the carburetor; below the hand wheel and at right angles to the steering post a lever *s*, which controls the motor speed by the exhaust. The left foot of the driver rests on a pedal, which first slows the vehicle down and then applies the brake on the lower change gear shaft. This shaft extends some distance out of the case and the projecting part carries a brake drum of cast iron, to which a cast iron brake shoe is applied. The large hand lever outside the carriage body is used to apply the band brakes on the hubs of the rear wheels.

A pump with a three way cock may be fastened to the dashboard for pumping oil from a tank into the motor crank case and into the change gear case. This spark coil is also located on the dashboard, and the dry battery and gasoline tank (4 gallons capacity) under the seat.

Among the details of this vehicle the steering knuckles (Fig. 3) are to be mentioned. The total weight of the forward

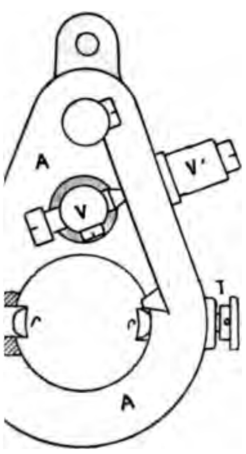


FIG. 4.

hicle rests on the heads S on G in this drawing is a com- se cup screwed into the top of the axle end E. The up- he pivoting shaft A is sur- a two part bronze bushing is always a certain amount r, as otherwise the dust and on destroy the wearing sur- le spindle V is bolted to the hown. The cap is secured threaded stud and nut *n*.
aped base A of the trembler ich was formerly made of ite, is now made of white the post V is insulated. rrives at this insulated post rough the spring and metal metal frame of the vehicle ole of the battery is ground- oval of the trembler base is ed by the new method of illustrated in the drawing. n shaft is mounted a sleeve, of two spring pressed pins n notches in the circumfer- leeve, thus holding the base inal movement in the direc- shaft. When the pins are dly the base can be slipped over the ignition cam and of the keyed or primed cam d.—*Drawings from La Loco-*

utomobile Association Meeting.

tee of the "Deutscher Auto- ad" met at Berlin on Octo- premises of the German Au- . After a prearranged order or the meeting had been rd of governors was elected. amend the constitution in th the corporation laws, for f incorporating the associa- rred to the board of gov- g decided that in case only anges should be deemed the corporation bureau the rnors should have power to inges, but that if changes in e necessary the question should be brought before the next automobile congress.

It was decided that a year book should be published by the association.

It had been proposed by the Frankfort Automobile Club that the association should express itself against the resolutions recently adopted at a meeting of German lawyers that the law relating to the responsibility of railways should be also applied to public automobile enterprises and that such enterprises should be required to organize with a view of jointly meeting possible damage claims. In an extended discussion the idea was generally expressed that the recommendation of the lawyers was born of ignorance of the general safety of automobile vehicles and it was decided to instruct the board of governors to lodge a protest against any such legislation with the Department of the Interior.

The committee then decided that, in view of the general complaints of automobilists, the board be requested to urge uniform police regulations with the proper authorities.

Considerable discussion followed the proposal of organizing a press bureau. The opinion prevailed that the objects in view—to successfully fight antagonistic movements and to arouse general interest in the cause of automobilism—could only be attained by working on a large scale, and since the means of the association were insufficient for this purpose it was suggested that the industry, which was especially interested, and the individual clubs be asked for voluntary contributions to render the plan feasible. The board of governors was requested to take the steps necessary to this end.

It was decided that when members of the clubs belonging to the association were involved in cases at law in which principles were to be decided (test cases) the association should bear the costs of the proceedings. Whether a case comes under this classification or not will be decided by the association committee.

An agreement has been reached with the General German Insurance Association of Stuttgart in regard to insurance against damage suits, whereby specially advantageous terms are offered to members of the association.

The meeting was followed by a dinner in the club rooms of the Automobile Club.

Comparative Prices of English and French Cars.

Subject to certain individual exceptions, the English motor car is dearer than its French prototype. This is even the case when the profits and expenses of the agent are added to the Paris prices. The chief exceptions are those French cars which have earned a special repute, and command more or less fancy figures. That motor vehicles can be made more cheaply in France than in Great Britain is undeniable, and a striking illustration to the point is the fact that one well known English firm makes one type of car in England and imports another from France. The latter is made with English capital, but could not be turned out at the same price at home.

What is the explanation? Mainly the fact that everything is better organized in French factories owing to the longer time the motor car industry has been at work in France. But the English maker is hampered in another way, and that is through the difficulty of obtaining at home the parts which he does not make himself. The French motor builder can count on procuring everything he wants without going afield, because allied industries have recognized the importance of the motor car movement. On the other hand, the English maker cannot get his casting done as well at home as abroad; for the best induction coils, batteries, and insulating wire he must go to France; no one in England can make springs comparable with the French types; and, sad to say, even raw material of the right kind cannot always be obtained in England. It is a literal fact that the steel for motor car axles is mostly imported from France. And until the enormous future of the home industry is recognized by other trades, the English motor builder must continue to buy abroad such material and parts as he cannot make himself or procure near at hand.—*Daily Mail.*

The *Morning Leader*, London, in its issue of October 28 prints a map of the district south of London in which the usual fines for furious automobile driving in the various towns are graphically indicated and in which districts having police traps are indicated by shading.

In answer to an interpellation in the British House of Commons, on October 27, Walter Long, chairman of the Local Government Board, said that in May last he indicated the general lines on which amendment of the light locomotives on highways law should proceed, and that there were considerable difficulties in the way of a settlement. At present he could not give any pledge as to legislative proposals for next session, but it would be a matter of satisfaction if he found it practicable to deal with the matter then.

No less than five automobile shows are proposed in England for the coming winter. On November 21 the Stanley show will be opened at the Agricultural Hall, and simultaneously the National Cycle and Motor Show will begin at the Crystal Palace. From January 16 to 24 the "Stanley Automobile Exhibition," a new venture, will be held at Earl's Court, closely followed on the 31st by the Motor Traders' eight days' show at the Crystal Palace, at which the most important English makers will be represented. The Agricultural Hall show, no longer under the control and patronage of the Automobile Club, will take place in March.

Excesses in England.

At the meeting of the executive committee of the A. C. G. B. and I. on November 3. Colonel Crompton drew attention to the fact that inconsiderate driving is on the increase, and that consequently the dislike for motors is on the increase, and unless inconsiderate and selfish driving be stopped the chances of securing the removal of the specific limit of speed will become more and more remote, and, on the contrary, automobilists would have to expect more severe restrictions than at present exist.

Colonel Crompton stated that in his opinion this bad feeling was being created by a small number of owners who drive racing cars of absurdly high horse power. The club ought to do something to check the use of racing cars, as their employment was unnecessary, and their owners use them solely for the gratification of their own selfish pleasure, irrespective of the fact that in doing so they are making the highways of the country almost unusable for other road users. The club should endeavor to identify those offenders, and, if they are members of the club, to warn them that the continuance of that practice would end in their expulsion from the club.

A special committee, consisting of Sir John Thornycroft, Colonel Holden, Colonel Crompton, and Messrs. R. E. Phillips, Staplee Firth, Manville, and the club secretary, was appointed to consider what steps should be taken by the club in this matter.

Transportation of Gasoline in England.

The differences between the English railroad companies and gasoline dealers are on a fair way to a settlement. A meeting was held on November 4 at which the railroad managers offered provisionally to withdraw that portion of the offending clause which saddled the trader with full responsibility for damages arising directly or indirectly from the inflammable quality of the goods. This offer was accepted by the traders.

A committee, consisting of two representatives of the traders and two railway representatives, was formed to draw up a more satisfactory clause, to be inserted permanently in the consignment notes of the various companies. The traders on their part agreed to send the goods by the railways again. For a fortnight they had held every order of gasoline back. The result was something like a gasoline famine. The price rose like a rocket. Ordinarily it is 1s. a gallon. In many districts it went up to 5s. 6d. At Cambridge it was 4s. 6d.

The A. C. G. B. and I. has appointed a committee to devise plans for future automobile trials.

The Coach Makers' and Coach Harness Makers' Company—one of the ancient guilds of the city of London—has decided to include in its list of competitions next year, for the first time, the designing of an automobile. The competition is open only to British subjects resident in the United Kingdom.

The Italian postal authorities are now making trial of automobiles to open up districts intermediate between the towns which would otherwise be served by horse traffic. A service has just been established between Spoleto and Norcia, and a few weeks ago a caravan of automobiles, bearing various grandees and local magnates, was sent over the journey.

In 1901 the exportation of French bicycles and automobiles amounted to 21,235,887 francs ($4,098,526), as against 4,405,820 francs ($850,323) in 1894. England, especially for automobiles, has been France's best client. The importations for the year 1901 amount to 5,331,840 francs ($1,029,045), as against 10,404,300 francs ($2,008,030) in 1894.

A patent has recently been issued in Hungary for an accumulator in which air pressure can be raised to increase the voltage of discharge. The cells are made air tight and sufficiently strong to withstand a pressure of several atmospheres; a safety valve is fitted to prevent abnormal pressures. The pressure of the electrolytic gases is calculated on, but if this should be insufficient the pressure can be raised by opening a valve placing a pressure tank in communication with the cell.

Export Conditions.

The returns of the United States Bureau of Imports and Exports for the month of September show that the exports of automobiles for the first nine months of this year have been about four times as large as during the same period last year. It can therefore be said with assurance that the American automobile is rapidly gaining in favor abroad, and the hope seems justified that, like other products of the American mechanical and electrical industries before it, the Yankee auto is about to conquer large markets in Europe.

In this connection it will be well for our manufacturers to study the special demands made of automobiles in the various countries which offer opportunities for a market, both by law and popular bias. It is, of course, evident that the laws relating to constructive features of automobiles must be complied with, and these laws, especially in Prussia and France, for a long time proved a barrier to the importation of American steam carriages. However, these laws or regulations have now been so amended in both countries that by suitable and not very expensive modifications the average American steam carriage may obtain a certificate of ap[...] The regulations regarding brake[...] practically uniform throughout conti[...] Europe, and they also call for ad[...] to the average steam carriage. A[...] point fixed by law is that the ope[...] view ahead shall not be obstruct[...] parts of the vehicle or by persons, a[...] this reason many of our surrey d[...] operated from the rear seat, or ph[...] with collapsible or detachable front[...] would not be sanctioned.

In exports in other lines it has[...] demonstrated time and again that [...] cure a market in any foreign count[...] special tastes and prejudices of its [...] must be reckoned with. Automo[...] being generally new, the populace [...] course, no such confirmed notions [...] what a vehicle should be than it ha[...] regard to older and more commo[...] cles of trade. Yet some rather deep[...] ed ideas are extant which it would [...] ficult for the representatives of Am[...] manufacturers to "explain away," [...] they should be right in their conte[...] For instance, tiller steering has be[...] tirely abandoned on the Contine[...] though in the early years it was use[...] considerable extent. We may here[...] that for light vehicles the tiller o[...] lever is the preferable method of st[...] and may have our opinions of the [...] why it was supplanted by the wh[...] Europe, but the native who knows[...] observation that this method of st[...] was in vogue years ago and has [...] out of use now will consider it anti[...] and count it a point against the veh[...]

Another feature which counts for[...] in Europe than here is fuel econom[...] manufacturers contemplating doing[...] siderable export business will do [...] develop this feature. Besides it is [...] portance that motors and carburet[...] so constructed that a 50 per cent. a[...] mixture can be used in place of ga[...] No particular difficulty attaches t[...] problem, and while the purchaser m[...] figure on using the alcohol norma[...] will consider the possibility of its [...] feature of value and a sign of "up t[...] ness," as all French machines are n[...] constructed.

It appears that in France the *to[...] nier cri* in automobile construction [...] features of the Mercedes machine. [...] who can command the prices and [...] shop equipment allows of it are c[...] this vehicle as closely as the paten[...] allow, and others simply claim tha[...] machines are "built just like the [...] cedes," although the divergence in [...] tial points may be considerable. [...] fact is here mentioned, not with a [...] encouraging copying this particula[...] chine, but as illustrative of the f[...] which sways the movement in Franc[...] beau monde has approved of this p[...] lar vehicle; the bourgeoisie wants [...] think "just like it"—but cheaper.

W VEHICLES AND PARTS.

The Sterling Express Wagon.

ne Sterling Power Vehicle Company, Broadway, New York, recently incor-ted, purposes to build self propelled d vehicles only. The accompanying cuts illustrate a 3 ton express wagon ch was designed by B. D. Gray, the pany's engineer. A patent has been ap-l for on the system of power transmis- and motor suspension by the in-or, W. H. Sterling.

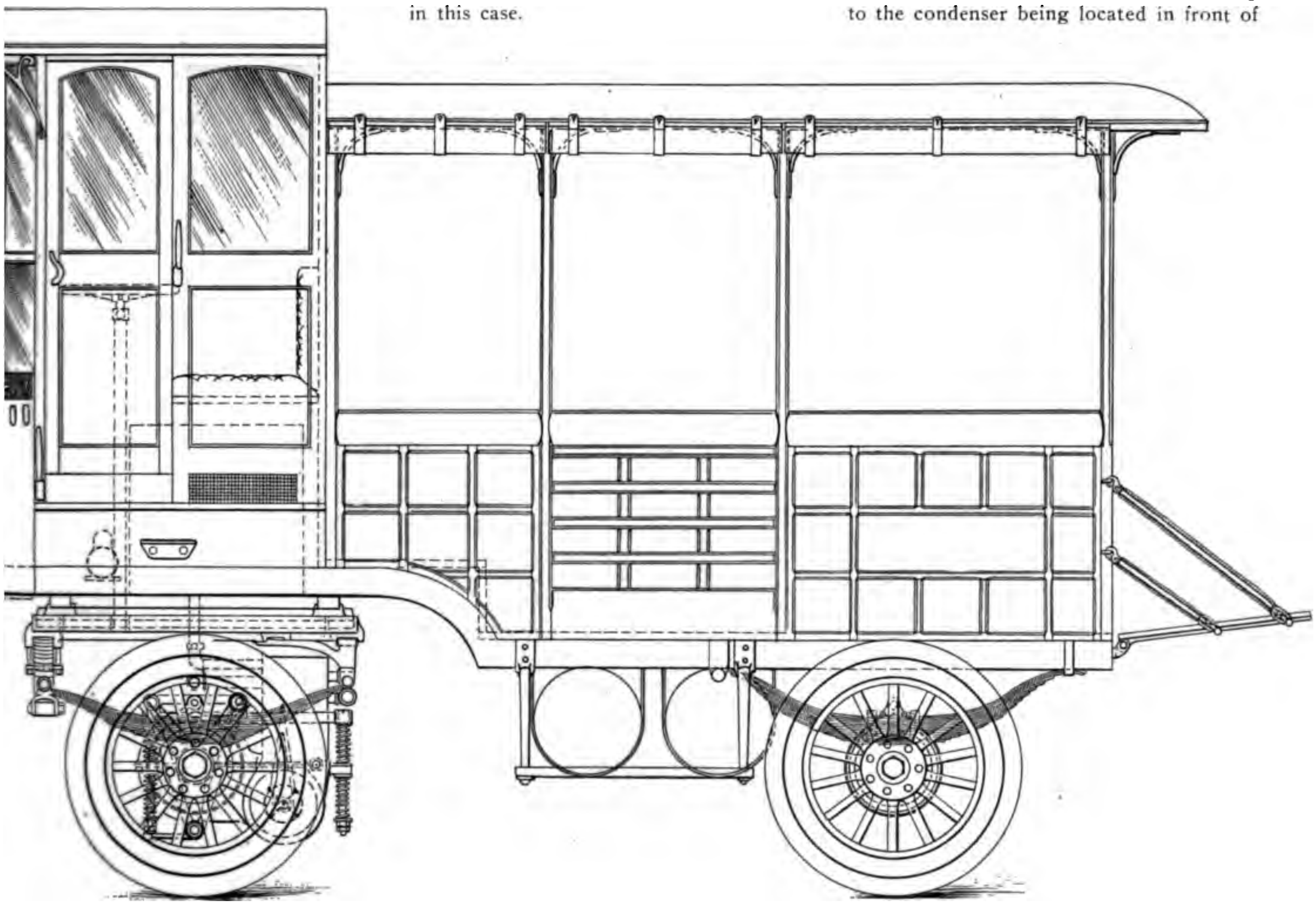
he wagon is front driven and is also red by the front wheels. To do away knuckles and bevel gears, which are rally employed in connection with the ing mechanism of driving and guiding els, the front axle is turned around a ical axis which is the axis of the "fifth el." In order to reduce the friction reen the rings that constitute the fifth el rollers are interposed between them. he company does not intend to confine f to the steam engine as motive power, much as it considers that an electric in explosive motor may be hung in the e way. In the present design a 25 se power water tube boiler is located ler the driver's seat in the cab, and fur-hes steam to the engine, which devel- 15 horse power at 600 revolutions per minute at a gauge pressure of 150 pounds per square inch. The engine has four single acting cylinders, with a bore of 4 inches and a stroke of 5 inches. All the valves are of the poppet type and are cam actuated. There is no link motion, the cut off and reverse being controlled by the cams which form a sliding train shifted by the operator by means of a lever. No crossheads, piston rods, stuffing boxes or sundry parts are employed. All the reciprocating parts of the engine are lubricated by the splash system, the crank shaft revolving in an oil and dust proof case.

The engine drives the front axle by means of spur gears, all of which are enclosed in a case, the upper half of which is cast integral with the engine cylinders, and the lower half of which forms an integral casting with the crank case. When bolted together the alignment of the parts is secured and the structure is self contained. Eight coiled springs are provided, four in front of the differential and four back of the engine. Half of the total number are compressed when the engine drives. As soon as the direction of motion is changed the other half are compressed. Although the throttle may be opened suddenly, the application of power is gradual, owing to the shock absorbing action of the springs. When steam is turned on the engine tends to revolve around a certain axis, which must be that of the front axle in this case.

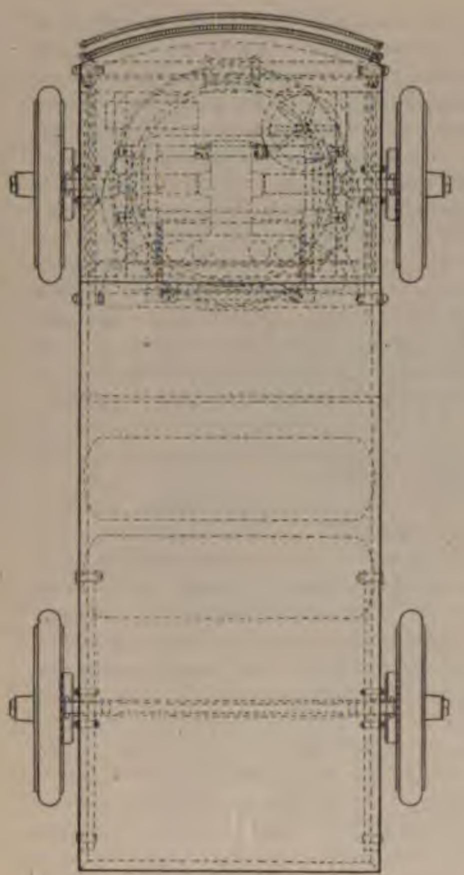
The equalizing gear is of the spur type, its master gears being of the internal variety. Thus the pinions may be larger than those of a balance gear, the ordinary type, the outside diameter of the differential's drum being the same in both cases. The master gears are keyed to hollow sleeves, which drive the solid shafts (2½ inches in diameter), to which the front wheels are keyed. The 8 inch bearings in which the live shafts revolve are bushed. The steel castings containing the bushings are equipped with plates, to which are bolted the springs. Three heavy arms are cast integral with each of these castings, and running through the eye of each arm to the corresponding arm of the other fitting is a bolt.

In front the vehicle rests on two semi-elliptics and a platform spring. The former are 42 inches long and the latter 53 inches between the eyes. In the rear are two semi-elliptics 48 inches in length. All the springs have a width of 3 inches, and their leaves range from one-quarter to five-sixteenths of an inch in thickness.

The rear axle is a solid forging of a square cross section (3x3 inches.) The main sills are steel channels (4x1⅝ inches). Below them and forward of the rear axle are located the kerosene and water tanks, each having a capacity of 40 gallons. Their diameter is 15 inches and their over all length 40 inches. Owing to the condenser being located in front of



SIDE ELEVATION OF THE STERLING MOTOR EXPRESS WAGON.



PLAN.

the cab the water capacity is said to be sufficient. The tubes, of an oval section, are equipped with radiating disks and are so arranged that the exhaust enters a pair of them at a time. They are, of course, arranged in series, each series consisting of two rows of a pair of tubes.

The general dimensions of the truck are: Wheel base, 8 feet; tread, 5 feet 6 inches; length of loading platform, 9 feet; width of loading platform, 4 feet 8 inches; height of platform above ground, 3 feet over all length, about 13 feet; over all width over hubs, 6 feet 10 inches; extreme height, 10 feet.

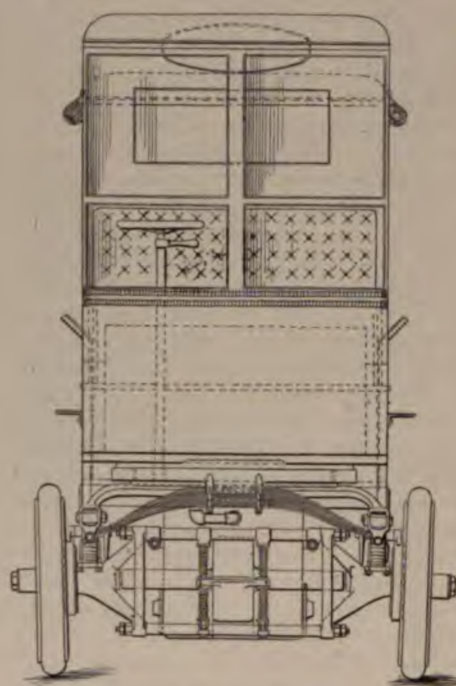
The wheels, having a diameter of 36 inches, are shod with 5 inch solid rubber tires. The hubs, of the artillery pattern, are fitted with brake drums, provided with double acting band brakes. Those of the rear wheels are applied first to relieve the fifth wheel of unnecessary strain when braking. The front and rear wheels are dished quite perceptibly. In future the company may employ large steel shod wheels in the rear, instead of the rubber shod wheels that were adopted for the present.

The wagon is said to weigh about 2½ tons and to be capable of traveling at the rate of 6 miles an hour on the level with a full load.

Binney & Burnham Steam Touring Car.

The accompanying cut shows a touring car just completed by Binney & Burnham, Boston, Mass., for Elliot C. Lee, vice president of the Massachusetts Automobile Club. It is styled "Model D" by the manufacturers.

The boiler of this car is entirely of steel, 20 inches in diameter and 18 inches high.



FRONT VIEW.

The water glass is of the Klinger pattern. The burner is fitted with a pilot light and no torch is required. The automatic fire shutdown operates at 200 pounds. The feed of gasoline is controlled from the seat.

The engine is a double cylinder 3½x3½, double acting, with slide valves and plain bearings, is dustproof and runs in oil bath. The wheels have Archibald metal hubs and are fitted with plain bearings and New York Belting and Packing Company's 32x3 inches long distance tires. The running gear is of new design and claimed to be flexible. The wheel base is 6 feet 10 inches, tread 4 feet 8 inches. The body is large and strongly built, with a comfortable front seat which may be closed. A large tool box is provided and a place for two boxes. It has side panel doors.

The gasoline tank holds 14 gallons, and the water tank 48 gallons. A large air tank is fitted. Gasoline and air tanks are of pressed steel.

For the boiler feed there are provided a water pump on the engine run on the shaft, an auxiliary hand water pump and a Victor steam water pump controlled from the seat. A hand air pump and Victor air pump, controlled from the seat, furnish the fuel pressure.

The engine is lubricated by means of a pony Rochester automatic lubricator, which carries sufficient oil for 100 miles.

The McNutt steering gear is used, with wheel in centre or sloping and on one side, as desired.

The carriage further comprises the following parts and fittings: Ashton large face gauges, tank indicator, double acting brakes applied to wheel hubs, operated by foot locking lever; two Gray & Davis side lights and one "Neverout" searchlight in front; Brown-Lipe spur, dust proof compensating gear; a feed water heater, located on left side, close to exhaust; a throttle with snap lock; an auxiliary throttle; a reverse lever fitted with hair teeth on quadrant and latch; Baldwin roller chain, ½x1¼ inch pitch, and a Mason tank filler.

The Hall Gasoline Touring Car.

The Hall tonneau, which is about to be put on the market by the Hall Motor Carriage Company, of Dover N. J., belongs to the heavy class of automobiles, its weight being over 2,400 pounds. In the design of this vehicle many departures have been made from what may be termed current practice. All the machinery is hung from

BINNEY & BURNHAM'S STEAM TOURING CAR.

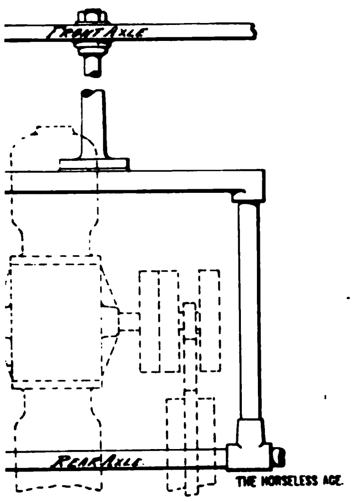


FIG. 1.

structure, the drive is by means :ars, the change speed device is n and planet type and the fly- located as far from the centre : frame as it could well be. Only ard gear speeds are provided, rather unusual in a vehicle of it.

companying cuts illustrate the rangement (Fig. 1), the exhaust rating mechanism (Fig. 2), and ıns, by means of which the ls are applied (Fig. 3). None of strations were drawn closely to approximately so.

ıeel base of the car is 6 feet 10 d the gauge is standard. The :h have fourteen wooden spokes shod with 34x4 inch Goodrich pneumatics. The front wheels \merican" ball bearings and the ont is a solid forging (1⅜x1⅜ The rear axle is live and re- plain bearings. Its diameter is s. The reach structure consists r, solid steel bar which is pivoted ınt axle and bolted to the rec- under frame. To the latter the ' is secured. The engine has etrically opposed cylinders, with 6 inches, and is rated at 16 horse he stroke is the same. A single : furnishes the gas mixture. The valves are of the induction type into the clearance space. Each has a casting screwed into it, ntains the exhaust valve. The :am actuated, as shown in Fig. :am shafts are located between ing cylinders and the flywheel Iriven by a combination of spur

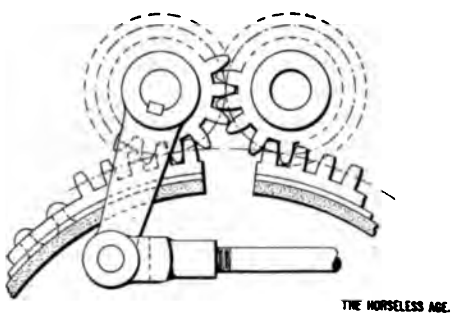
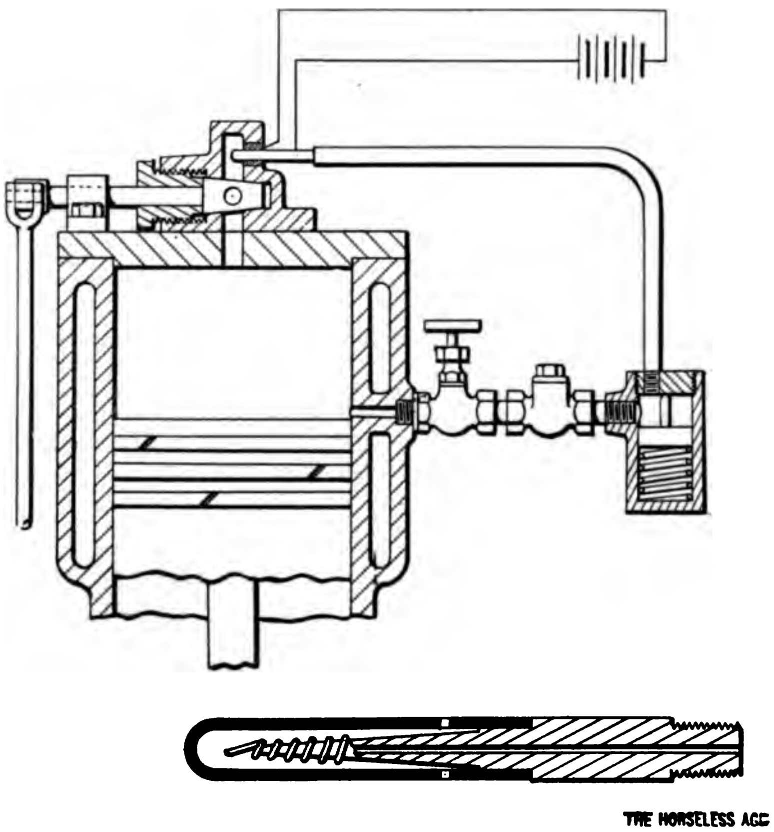


FIG. 3.

and bevel gears, eleven gears all told. In order to place the tonneau portion of the body over the engine, and still not be obliged to locate the floor of the tonneau much or any higher than the footboard in front, horizontal port valves have been adopted.

Lubrication of the pistons, the crank shaft journals and the wristpins is by means of splash. A water circulating pump is provided and is driven by means of a chain. A small oil well is secured to the crank case. It communicates with a larger receptacle in the body by means of a flexible tube. There are five copper tubes that conduct the lubricant to each cylinder and the bearings of the variable speed gear. The clutches of the latter are of the steel strap variety and are applied by means of cams, which are keyed to two shafts. Each shaft has a gear sector which meshes with the teeth of a rack. One of the racks applies two of the clutches; the other only one. But for the gear sectors and racks the speed controlling mechanism is of the same design as that of a well known light carriage; a hollow and a solid rod being controlled by the cam. Between the pinion of the speed gear and the differential a large spur gear is interposed.

The body rests on springs only, which need therefore not be very heavy. All of them are semi-elliptics, those in front being 36 inches long and the rear springs 38 inches. Each spring has five leaves and is 1½ inches wide. The body is of aluminum and has very spacious seats. It was designed and built by J. M. Quinby & Co., Newark, N. J.



THE BARLOW IGNITER.

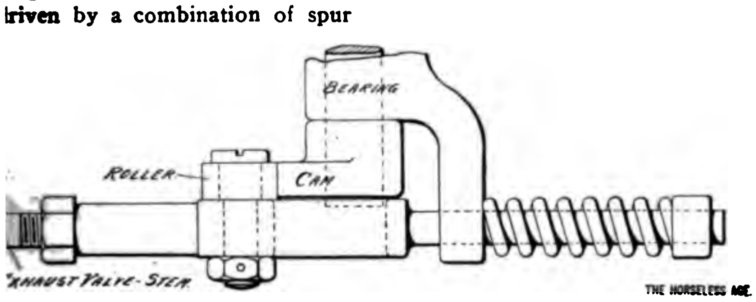


FIG. 2.

Barlow's Ignition Device.

Howard E. Barlow, of Providence, R. I., has invented an igniter for gasoline engines, particularly those of automobiles, depending upon the heat generated by the explosion in the engine cylinder. The device is illustrated in the accompanying drawing, and the following details are based upon information furnished by the inventor.

The ignition is effected by an incan-

descent point in a platinum tube which is closed at one end. This platinum tube is inserted, with its closed end through the wall of a chamber which is periodically placed in communication with the compression space of the engine by means of a rocking valve operated from the crank shaft of the engine. The open end of the platinum tube is connected to the engine cylinder, through the cylinder wall, at a point along the length thereof which is covered by the piston when the latter is at the end of the inward stroke. The connection from the tube to the cylinder leads through an equalizing chamber.

When the engine is to be started, the platinum point is heated to a red heat by passing a current of electricity through it from a battery. The engine is then turned over by hand, and during the upstroke or compression stroke the rocking valve to the ignition chamber opens, some of the charge comes in contact with the hot tube and the mixture explodes. When the piston has passed the opening in the cylinder wall leading to the equalizing chamber some of the hot burning gases from the cylinder pass through the equalizing chamber to the platinum tube, which intensifies and maintains the heat of the latter as long as the engine is in operation. The battery of two cells is used only for starting and is then switched off.

The equalizing chamber is for keeping gas pressure constant in the needle and is a small cylinder with a piston at its upper end. A spring under the piston keeps up a constant flow of gas into the needle. A stop pin above the piston keeps it from going too high and covering the inlet pipe. A check valve is inserted between the equalizing chamber and the cylinder, so that the piston on its down stroke will not draw out the gas previously forced into the chamber.

The period of ignition may be varied by means acting on the operating mechanism of the rocking valve.

The igniting tube, as stated, consists of platinum and has two vent holes. Into the open end is forced a brass holder having a shoulder to receive the tube and also a long tapering point, a platinum wire being wound around the point and projecting beyond it. The gas enters through an axial bore of the holder and strikes the previously heated platinum wire, thereby causing it to glow and intensify the heat of the wire and also of the shell. The gas then passes out through the holes of the holder.

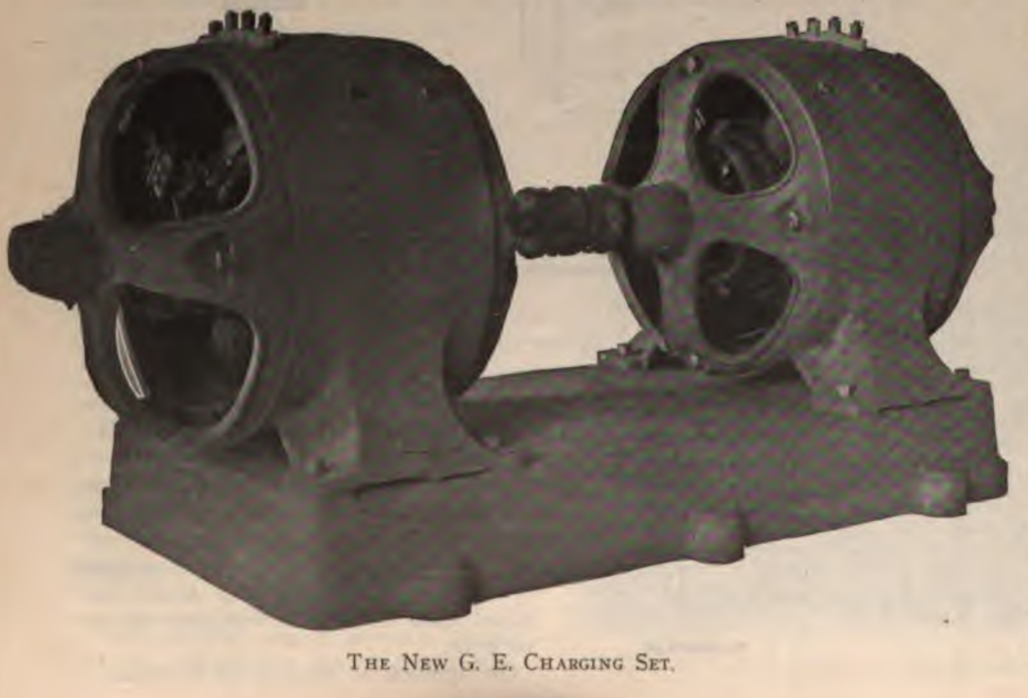
G. E Motor Generator for Storage Battery Charging.

The General Electric Company, recognizing the demand which exists for motor charging generator sets to meet the conditions of automobile battery charging, has developed a number of types and sizes of which the attached cut gives a good general representation.

One of the types comprises a motor adapted to be operated from the standard alternating current circuit of lighting companies; this motor, in turn, drives a small, direct current generator, which transmits the necessary current for charging the battery. Another type has a motor adapted for being driven by power supplied from the ordinary trolley wire of street railway systems, and this motor in turn drives a generator which produces current of comparatively low pressure and large quantity.

The use of these motor generator sets, to drive which current can be bought by meter from lighting or power companies, overcomes the annoyance otherwise attendant on the establishment of a generating plant, with its rather complicated engines and necessity for close su[p]
and attendance.

These motor generator sets ar[e]
require but little space, to be
tained, and not likely to get out
they may be left in operation
siderable periods without any
whatever. Automatic switches
used in connection with them,
when the batteries to which they
nected are charged not only will
rent be cut off from the battery,
current supplying the motor wi[ll]
off as well, and this without per[sonal at]tendance.



THE NEW G. E. CHARGING SET.

The "O. K." Transmission

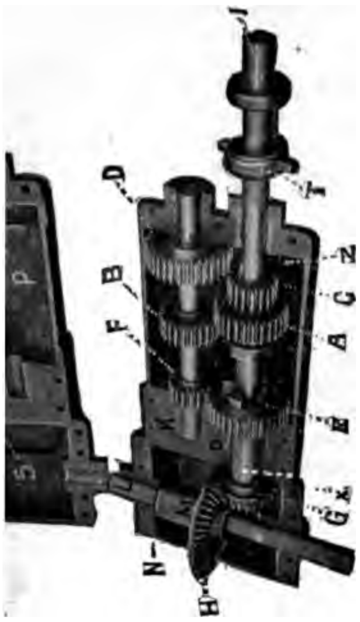
The transmission herewith il[lustrated]
gives three speeds forward and
verse, the ratios of reduction fro[m]
to rear axle, with a sprocket redu[ction of]
3:1, being 12:1, 6:1 and 3:1 for sl[ow, me]dium and high speed respectively.

Referring to the cut, the gear
the countershaft meshes into pinion
a shaft in line with the engine sha[ft]
which it slides on a key. Pinion
the countershaft meshes into g[ear]
which is fixed solidly to the bev[el]
G, which in turn meshes with th[e]
gear H upon a transverse shaf[t]
gives a reduction of 12:1, which
hill climbing speed.

The shaft upon which the gea[r]
mounted is cut at X and the end
rotates loosely in the hub or sleeve
gear E. The pinion A, which is
solid to the pinion C meshes into t[he]
B on the countershaft, if the two
pinions are shifted along the shaft,
the reduction of speed from mo[tor to]
driving wheels is 6:1. By movi[ng]
sliding pinions still farther along th[e]
ing shaft positive clutch teeth on t[he]
ing gear engage with similar clutc[h]
on gear E. The transmission is t[hen di]rect, the ratio of reduction being

When the sliding pinions A C a[re]
way between the gears B D no ge[ars are]
in mesh. While the sliding pinio[ns are]
in this position an intermediate
which is mounted upon an eccen[tric is]
raised and brought into mesh with
D, which gives a backward motion
reduction of 12:1.

The whole mechanism is enclose[d in an]
oil tight case, the total weight wi[th case]
being 150 pounds. Upon the hub
sliding gears is a groove in whi[ch en]gages a yoke for shifting the gears
different positions. The gear is in[tended]
for use with a friction clutch, and
the clutch is thrown out before the
are shifted, there is said to be no
when the gears engage. All the
are hardened steel, machine cut,
inch face and 8 pitch. The sha[ft]
1 3-16 inches in diameter. The bev[el]
is 7 pitch. An opening with an
tion door is left in the top of th[e]
Vaseline and heavy oil are recom[mended]



ʒ the case. The over all dimen- the gear case are 26 inches in ı½ inches in width, and 9½ inches t. Patents are said to be pend- e manufacturers of this gear are C. Machine Company, of Buffalo,

.COMMUNICATIONS..

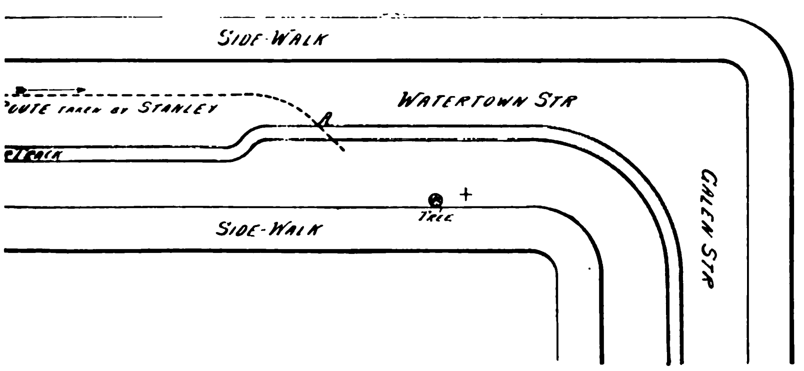
A Skidding Accident.

Iorseless Age:

n Stanley, of Newton, Mass., ır years of age, and a nephew of anley, one of the pioneer automo- ıufacturers of America, met with s automobile accident at Water- ı Wednesday evening, November lies in the Newton Hospital in ıerious condition. It is said that speeding his vehicle and in mak- ıarp turn to cross the street was ut by the overturning of the auto. sumption is that the wheels either n the car tracks or in a rut, and ı the steering lever from Stanley's ıd before he could regain control was thrown to the ground. He was not an employee of the Stanley Brothers Automobile Company, as the daily newspapers stated, but was employed in the dry plate works controlled by the Stanley Brothers.

As there were no witnesses to the accident, the manner in which it occurred can only be conjectured. It is to be inferred that he was speeding the auto down Watertown street, as seen in the sketch herewith, and in crossing the car tracks to turn down Galen street took too obtuse an angle, which caused the auto to skid, hit the tracks and upset, throwing him out and then sliding across the tracks to the tree, at the foot of which it was found, while Mr. Stanley was quite a few yards beyond it, at the point marked by the cross. He was not racing, as one of the papers stated, but was speeding up to get to his destination on time, and was traveling probably at the rate of 20 miles an hour, and not being an experienced operator did not realize the danger from skidding on the wet surface of the street, which was very muddy at the time. There was no evidence to show that the auto collided with the tree.

A telephone call this morning reports that Mr. Stanley may recover, but at the present time the physicians do not hold out too much hope. J. C.



Scene of the Newton Accident.

Explosive Engine Queries.

Editor Horseless Age:

Will you kindly tell me through your Queries Column what would be the cerrect size of the inlet and exhaust passages of a 4x4 four cycle French type motor to give the best speed and power; also, what do you consider is the best method of finishing a piston and rings of cylinders? Is it a good plan to grind them, or would you put them together rough and let them wear smooth?

Can a cylinder be made that will hold the compression for any length of time without leaking by the piston? F. F.

[The effective diameter should be about 1¼ inches for both exhaust and intake valve. The intake valve passage usually contains a spider for the valve guide, which makes its area somewhat less than the area of the exhaust passage, which is permissible. The cylinder is bored as smooth as possible and the piston and rings are either ground or turned as smooth as possible, grinding being no doubt preferable. If the piston rings and valves fit perfectly the cylinder will hold compression for ten minutes or longer.—Ed.]

Who Makes These Hubs?

Sheboygan, Wis., November 10.

Editor Horseless Age:

Would you kindly inform me where I can get hubs for wire wheels about 7 inches long and flange 5 inches in diameter, drilled for forty quarter inch spokes?

Hans Sattler.

Saved Him from Many a Mistake.

Editor Horseless Age:

It gives me much pleasure to renew my subscription to The Horseless Age, as I consider it the best automobile paper published.

The letters from users of the various styles of motor cars are to a prospective purchaser worth ten times the cost of the subscription, and they have saved me from many a mistake.

The letters from physicians are very valuable, as the machine is in their hands for business, and they have a wider range of experience than any other class of users.

Your course in publishing accidents, whether from defects in motor, carriage, running gear or other causes, is to be highly commended, and should be appreciated by the maker as well as the prospective purchaser. N. W. Kenyon.

Wants a Large Air Cooled Engine.

San Jose, Cal., November 11.

Editor Horseless Age:

Can you furnish me the address of a firm that manufactures a four cylinder air cooled gasoline engine of 16 to 24 horsepower? Chas. V. Randall,
391 West Santa Clara Street.

[We do not believe such engines are made.—Ed.]

A. C. A. Elections.

At the elections of the Automobile Club of America held at the clubhouse on Monday night, November 17, the regular ticket was elected without opposition, as follows: President, Albert R. Shattuck; first vice president, Winthrop Scarritt; second vice president, James Stillman; third vice president, W. K. Vanderbilt, Jr.; treasurer, Jefferson Seligman; governors (to serve three years, class of 1905), Col. John Jacob Astor, George F. Chamberlin, and Peter Cooper Hewitt; governor (to serve one year, class of 1903), Harlan W. Whipple.

A report was submitted by the good roads committee, which is printed in full on another page.

LEGISLATIVE AND LEGAL.

The Nyack Case—Lovatt versus Wallace.

A case of great interest to the automobile world was partially tried and then settled out of court at New City, Rockland County, N. Y., last week. The case was that of Sarah T. Lovatt vs. Edward Copeland Wallace, and it came before Justice Samuel T. Maddox in the Supreme Court, sitting at New City, the county seat of Rockland County. The trial was commenced Wednesday, November 12, in the afternoon. It continued through Thursday and up to noon of Friday. By that time the testimony for the plaintiff was all in. During a recess of the court the defense decided to settle the case outside of the court's jurisdiction. This was done by the defendant paying the plaintiff the sum of $8,750, whereupon the suit was discontinued.

A brief review of the facts of the accident on which the suit was based is necessary. On May 29 last Edward C. Wallace, an iron merchant of New York city, accompanied by his fourteen year old son, Edward K., started from New York city in an automobile to ride to Tuxedo Park. The automobile was a gasoline machine, of American make, said to be capable of a speed of 17 to 19 miles per hour, being 7 horse power. Mr. Wallace went from New York to Tarrytown and crossed the river at that place to Nyack, intending to proceed from there by the direct route to Tuxedo Park. While going down a steep hill on the outskirts of the village the Wallaces met a horse and buggy being driven by Mr. and Mrs. Edward T. Lovatt. Mr. Lovatt is a New York city lawyer with a summer home at Spring Valley, N. Y. At the time he was on his way from that place to Nyack. The horse became frightened at the sight of the automobile and dashed up an embankment, throwing out both occupants of the vehicle. Mr. Lovatt's contention was that when he saw the automobile coming he stood up and raised his hand as a signal for the automobilist to stop, as he knew his horse's great fear of the machines. He also alleged that the automobile was going at a higher rate of speed than allowed by law. On the other hand, Mr. Wallace and his son claimed that when they saw the signal the machine was immediately stopped, and at the time the rate of speed was about 8 miles an hour. Thinking that the accident was not a serious one, Mr. Wallace continued on his way, but was stopped at Spring Valley by John Lovatt, a son of the lawyer. Young Lovatt had barricaded the road as a result of telephonic instructions received from his father. Mr. Wallace was subsequently placed under legal arrest, while his son was allowed to proceed on to Tuxedo Park with the automobile.

Mr. Wallace was tried before Justice of the Peace Fisher in Nyack on a charge of violating Sections 167 and 169 of Chapter 568 of the laws of 1900, as amended by Chapter 531 of the laws of 1901, in that he refused to stop his automobile upon signal from a person driving a horse and that the automobile was exceeding the legal rate of speed at the time. After a bitterly fought trial of three days Mr. Wallace was found guilty and fined $10.

As a result of the accident, Mrs. Lovatt was severely injured, sustaining a broken arm. Mr. Lovatt was badly shaken up. The woman commenced an action for damages against Mr. Wallace in the amount of $20,000, and this was the case which came on last week. Lawyer C. N. Bovee represented the defendant and Lawyer A. S. Tompkins, of Nyack, the plaintiff. The trial did not continue long enough to enable Justice Maddox to rule on all the questions involved, but some points of interest were brought up.

Mr. Lovatt was the first witness for the plaintiff. Regarding meeting the automobile he testified as follows:

A. The horse was walking up the hill, I having the reins in my right hand. Suddenly I discovered an automobile coming around in front of Summers' horse and wagon, which had just previously backed up in front of the store. As soon as I saw the automobile, being on the right hand side of the wagon, sitting there and the horse's head obstructing me, I rose to my feet, taking the lines in my left hand. I waved my hand back and forth over my head and shouted "Stop." I then sat down and took the lines in both hands and spoke to the horse. The horse now saw the automobile coming. I saw that the automobile was not stopping, so I sprang to my feet again and waved my hand more vigorously, and shouted. By this time Mrs. Lovatt had begun to shout: "Please stop," as loud as she could. Some voices in the road also shouted: "Stop, don't you see that lady and gentleman are in trouble?" Well, as quick as it has taken me to say this the automobile sheered toward my horse, coming in a zigzag course toward it.

Q. Across the road?

A. Yes, toward the horse; and instantly the horse plunged over the walk and up the embankment; Mrs. Lovatt was thrown into the air and landed in the ditch. On the instant I held the horse, but the wagon tilted back, and I, standing on my feet in the wagon and trying to calm the horse, and shouting: "For God's sake, why don't you stop?" But the automobile slipped by me, and just as it did that the horse made another plunge and threw me out. The automobile continued on down the hill at a high rate of speed, never stopping.

In regard to the speed of the auton Mr. Lovatt testified:

Q. About what was the rate of when you first saw the automobile?

A. I should think it was going 30 an hour. It went past like a sho did not slacken or lessen its speed the time I first saw it until it disappea

Upon cross examination Mr. Lovat that he had never ridden in an auton but he thought he could judge their because he had seen a great many had ridden on railroad trains and driven fast horses.

Mrs. Lovatt, who was next o stand, gave substantially the same mony as had her husband. Davi Summers, who saw the accident, als tified. There was a lively tilt be counsel when the lawyer for the pl asked him what in his judgment w rate of speed at which the automobil traveling. Mr. Bovee, for the defe said that the witness was not qualif judge. Mr. Tompkins, for the pl said that he was. Addressing the cou latter said:

"There is no possible way by wl witness can be specially qualified t tify to the speed of any vehicle. Of c no witness can testify precisely the ber of miles per hour that an automo traveling. Even the most expert dri an automobile, I dare say, can't do unless the speed is regulated in som or kept on the machine. So that an son that sees an automobile in mot as competent to testify to its speed other person, whatever his positior be. Now counsel admits that in ligence cases witnesses are frequentl mitted to testify their judgment reg the rate of speed, but he says they q I would like to have him tell me they qualify. I have examined wit many times for the purpose of tellii rate of speed of a train of cars, can't recall a single instance in which was any attempt made or any requir that there should be an attempt m qualify the witness before asking his ion. The courts are constantly rec just such testimony as this."

In reply to this Mr. Bovee, for tl fendant, said as follows: "In the place the testimony asked from thi ness is expert testimony. It is an o as to the speed at which this auto was going. We are here with that sition. The witness is called upon t his opinion of the speed, because l no record of the actual speed. He d time the automobile at that time, he nothing about the possibilities of tl tomobile with respect to speed, he no notice of the time he first saw the time he last saw it; he is not pert in automobiles and he has neve sessed one in his life. There is n dence that he ever tested an autoi in his life, or that he ever tested the of a railroad train in his life. Mr.

kins says: 'We can't do it in any other way than by him.' If the witness is not qualified he says they can't do it in any other way. That is something with which the court has nothing to do. That may be a misfortune. But the court simply sits here to take the evidence, and when it takes it it must be under the well established rules of evidence. Now, a railroad engineer, driving his engine from day to day and taking note of the time that elapsed from one point to another, and knowing the number of miles between the points becomes, by reason of that very fact, an expert as to the speed at which the engine was running. That is his business, he is observing it all the time. A driver of an automobile, which in itself is an engine, from his experience in noting the operations of that machine, the time it takes him to go up hill, the time it takes him to go from Nyack to Nanuet, the time it takes him to go from Tarrytown to Dobbs Ferry, and knowing the number of miles, becomes an expert and a judge of the rate of speed at which his automobile is traveling. A man is driving a horse. He knows that to come from Mr. Summers' store down to the post office here is a mile. He drives back and forth from day to day and he knows how long it will take him to do that, from the very experience he has. In fact, he becomes an expert on that particular vehicle. But when you come to flash by the man a locomotive, a train of cars or an automobile, without any experience in testing the speed of any of them, either in driving them or in observing the time that elapsed in going from one point to another, the man is absolutely unqualified and incompetent to testify, for the reason, the simple reason, that it is imagination and speculation. That is what I mean when I say that a witness must be qualified, and this gentleman is no better qualified than I would be. And I am sure that my judgment would not be worthy of a moment's consideration on a question of that kind, because I am not an expert on automobiles."

Justice Maddox's ruling on this point was brief. He said that a witness could testify as to whether in his judgment an automobile was going slow or very rapidly, but to be competent to tell how slow or fast it was going he must have had some experience to qualify him to testify. His experience need not necessarily be with automobiles, but if he had had experience with the speed of horses or railroad trains he could testify. Under this ruling Mr. Summers testified, as he owned and drove horses and had ridden a great deal on railroad trains. In answer to the question as to what in his judgment was the speed of Mr. Wallace's automobile, he said between 25 and 30 miles an hour, at the time he saw it go down the hill, past Mr. Lovatt's horse. Other witnesses were examined for the plaintiff and her case was closed with the testimony of several physicians as to her injuries, including that of Dr. A. Monae Lesser, surgeon of the National Red Cross Society. Mrs. Lovatt's injuries were of a serious nature, including a broken arm, and are likely to permanently affect her.

The plaintiff had made out a strong case, and rather than be annoyed further with the matter and perhaps run the risk of an excessive verdict being rendered against him by the jury, which was composed of country people, who would, if anything, be prejudiced against automobiles, Mr. Wallace came to the conclusion that he would settle the case out of court, before putting in a defense. A conference was held between the contending parties, and as a result Mr. Wallace agreed to pay the plaintiff the sum of $8,750, in full settlement. The case was thereupon discontinued.

While the case did not proceed far enough for Mr. Wallace to put in his defense, yet he made a very strong defense when he was being tried on the criminal charge before Justice of the Peace Charles Fisher in Nyack, and as his testimony at the damage trial would have been the same, we take from the records of the first trial a summary of what the defense was.

Mr. Wallace testified that he himself had had little or no experience in managing an automobile, although he had ridden considerably. The automobile was owned by and had been purchased for his son, who is fourteen years of age. On the day of the accident the son was running the machine, and had control of it when the accident occurred. The young man had had six months' experience in operating the automobile in New York city, and had also had experience in Europe. He was fully qualified and competent to run it. Here follows a part of Mr. Wallace's testimony:

Q. Mr. Wallace, have you ridden in this automobile when the speed has been tested at various dates?

A. I have, sir.

Q. Have you tested the machine when it was going 8 miles an hour?

A. I have, sir.

Q. And at a greater rate of speed, say, 15 miles?

A. Hardly 15; 13.

Q. You have ridden in other automobiles a great many times, have you not?

A. A great many times.

Q. To what extent have you had experience in riding in this machine with your son at various rates of speed?

A. Very great.

Q. Is your son competent to run the machine?

A. Perfectly.

Q. Was the running of the machine by him careful and prudent, or reckless?

A. He has always been very careful and was upon this occasion.

And further on:

Q. What was Mr. Lovatt doing when you first saw him?

A. At the instant I should say that he was trying to stand up and wave his hand.

Q. Did you observe the speed of the machine at that time?

A. I did. We were going about 8 miles an hour.

Q. When you saw Mr. Lovatt wave his hand what did your son do with respect to stopping the machine?

A. He applied all the brakes, including the reverse.

Q. Did the machine come to a standstill?

A. It did, sir; absolutely.

In regard to Mr. Lovatt's control of his horse, Mr. Wallace testified as follows:

Q. What did you observe of the action of Mr. Lovatt in regard to the management of his horse?

A. Very incompetent.

Q. What did he do?

A. He seemed to be exceedingly excited. He had transferred the reins from one hand to the other and had not the horse under the slightest control.

Q. It has been testified to here that the automobile swerved toward the horse. Did it?

A. Not in the slightest, except that the machine was going down the road in the direction where the horse was.

The son, Edward K., a remarkably bright lad, substantiated his father's testimony and satisfied the court that he was competent to run an automobile.

Sidney B. Bowman, of 52 West Forty-third street, New York city, was called by Mr. Wallace as an expert upon the speed and management of automobiles. Mr. Bowman said that he was familiar with the Wallace automobile and knew the son well. In his opinion he was perfectly qualified to manage it. He said that a machine of its make was capable of a speed of from 17 to 19 miles an hour. A portion of his testimony follows:

Q. Have you seen the hill that was the scene of this accident?

A. Yes, sir.

Q. What would you say as to whether a hill of that grade would accelerate the speed of an automobile?

A. I would say that it would do so slightly if the machine was running at very top speed.

Q. If the machine was running at the rate of 8 miles an hour, would its speed be increased on such a grade?

A. Running at that speed it would not accelerate it at all. My reasons for making this statement are that the speed of an automobile is controlled by its motor, and the motor cannot run more than so fast. That is to say, that if the machine was going 8 miles an hour, which is the low rate, the motor at that speed would not run fast enough to permit the automobile to go any faster.

Automobile Regulations in Europe.

The advance sheets of the United States consular reports dated November 8 are devoted to automobile regulations in Europe. Following are some of the provisions of laws in countries which were not considered in our "Legislative and Legal Number."

AUSTRIA.

Types of vehicles are subject to inspection and approval by a commission of experts appointed by the local authorities, exactly as in France. Certificates of approbation are issued containing a description and diagram of the vehicle. These certificates are reproduced by the manufacturers and every purchaser receives a copy of such certificate, the number of the particular vehicle being added to the certificate.

Every automobile and motor wheel must be provided with a distinctly audible signal. The use of such special signals is prohibited to all other street vehicles. Each motor wheel must have at least one, and each automobile at least two, well burning signal lamps made of colorless glass. In automobiles these must mark the side boundaries of the wheels and throw their light so far ahead that the road in front of the driver is visible to a distance of at least 22½ yards (20 metres).

Automobiles and motor cycles must be provided with a sounding apparatus, the sound of which may be heard at a distance of at least 50 metres (54.6 yards).

Vehicles provided with rubber tires must in time of snow be provided with bells to warn pedestrians.

Automobiles, motor cycles, road locomotives and velocipedes must be provided with brakes susceptible of responding instantaneously and of wedging the wheels.

The speed of automobiles and motor cycles shall never exceed in the open country 50 kilometres (31 miles) per hour, and in traversing cities 10 kilometres (6.2 miles) per hour.

Operators of automobiles and velocipedes are obliged to slow up, and even stop, their vehicles at the approach of teams, carriage, draft, or saddle horses showing signs of fear.

NETHERLANDS.

To the carriage must be affixed in the front and back, in black or white Arabic figures on a white or black background, the rotation number; the figures must be at least 4.7 inches long and 2.4 inches wide. Between sundown and sunrise the number in front must be clearly shown by means of a light.

On both sides of the carriage a lantern giving a clear light must be carried; the light must be visible from ahead and from the sides.

The carriage must be provided with an apparatus by which, if necessary, it can instantly be brought to a standstill, within a distance of 10 metres (10.9 yards).

The carriage must be provided with a bell or horn, by which a sounding signal can be made, which must be distinctly heard at a distance of 100 metres (109 yards.

The speed may never be more than 20 kilometres (12.4 miles) per hour, and when descending a slope, when near or at a turn in the road, when crossing roads or at crossings, when passing over bridges or passing buildings, when nearing built up communities, the speed may not be more than 8 kilometres (4.9 miles) per hour. Also in foggy weather, that speed may not be exceeded on any road. Besides, the speed must be decreased every time that the safety of the traffic demands it.

When meeting or overtaking horses or cattle driven or led, the driver of the carriage must decrease the speed or stop as soon as he perceives that the animals become disturbed or when the driver or leader gives a warning sign. Besides, everything ought to be avoided that could cause the animals to become scared.

The driver of the carriage is obliged to give a timely and distinct signal with the bell or horn, when overtaking carriages or persons, loose horses, horses pulling vehicles or carrying riders, and cattle; or when nearing crossroads, turns of the road, and bridges; and, in general, when the traffic along the road requires it.

Each automobile must be able to describe a circle having a radius of 6⅔ yards (6 metres), each motor wheel one with a radius of 3⅓ yards (3 metres). Each automobile and motor wheel must display, on a conspicuous part, the name of the manufacturing firm, together with the official number of the type or system and the progressive manufacturing number.

The driver must not leave his automobile or motor wheel before he has stopped his machine and set the brake. He must also take heed that his vehicle is not set into motion by unauthorized persons. The rate of speed in inclosed spaces must not be greater than that of a horse at a good trot. In open places the speed may be moderately accelerated, but only on level, broad, and straight roads, along which there is little traffic. Speed must be decreased and, if necessary, the automobile or motor wheel be altogether stopped, if its approach is seen to frighten horses or other animals, thus giving rise to confusion and accidents. In all busy and narrow streets, around sharp curves, over crossings and bridges, and on inclines, the speed must be reduced to a pace of a foot walker, and increased again only when the driver is certain that it may be done in perfect safety. The warning signal must always be given in time.

Racing by automobiles and motor wheels in the public streets is prohibited, as are also trial trips by types of vehicles not yet approved, unless by special consent of the authorities, the conditions being fixed in each case.

For freight automobiles there are additional regulations that when w and load exceed a weight of 6,600 po (3,000 kilograms), the wheel felloes be 4 inches broad; when wagon and exceed a weight of 9,900 pounds (kilograms), the felloes must be 6 i broad. Freight automobiles havin total weight of 16,000 pounds (7,300 grams) are, as a rule, not allowe traverse public streets and roads, no bridges that occur on the way. Dr over bridges is, moreover, limited t bearing power of the same, usually re ed on the bridges.

BELGIUM.

All automobiles and motor cycles be furnished with two metal plates spicuously affixed, one on the fron the other on the back, bearing a r tion number taken from a special re for the whole of Belgium. These are delivered, on payment of their by the agents of the administration nated by the Minister of Agricultur Public Works.

All vehicles must carry, from ni until morning, at least one well l lamp, throwing the rays of light fo Automobiles and motor cycles must in addition, a lamp fixed on the b the vehicle in such manner as to illuminate the number mentioned i preceding paragraph.

The usual regulations for the co traffic and the customs with ref thereto must also be followed.

A motor carriage may not be a for pulling other vehicles.

These regulations (with permi register of persons holding permi tached thereto) must always be pre a motor carriage and can be amen added to at any time.

When the permit is to be ca amended or added to, the hol obliged to return these regulations permit, etc.) upon written notice, four days, to the Department of ways, Commerce and Industry.

When the carriage, by sale or means, is transferred to another the holder of these regulations (t mit is attached thereto) is obliged turn them immediately to the afore partment.

Another Arrest at Yonkers— ment from Police.

Following close upon the order by the chief of police of Yonkers men under him to arrest all au drivers, street car motormen, etc., v lated the municipal speed ordinan the first arrest there for automobil ing. Sunday before last Paul Ric professional chauffeur of New Yo ing a large imported tonneau car by two gentlemen and two ladies, rested on South Broadway by a

L. The method of ascertaining ɔximate speed of the vehicle is ave been as follows: The bicycle ı had measured off a distance on t mentioned which was equal to ɔlutions of the crank of his bike. ıe city aldermen had furnished the th a table of speed equivalents, to which it required a speed of :s an hour to cover the distance sured off in one minute. The bi- iceman found that Richards was at about 18 miles an hour, and m under arrest. The two ladies of the men in the car remained tel passed on the way to police :ers, and the hotelkeeper accom- .e vehicle to furnish bail for the chauffeur.

ɪnday morning the case came up ıstice Kellogg, who decided the nst Chauffeur Raymond recently. was charged with driving an le at a greater speed than the law nd it was also stated by the po- /ho made the arrest that he passed car and crossed the track in front udge Kellogg sentenced the ac- ten days in the city prison. The :or defendant at once left for lains to apply for a stay of sen- .ding an appeal to a higher court.

MENT OF THE CHIEF OF POLICE.

ıief of police of Yonkers, when a representative of THE HORSE- , after the trial, said that it was ı talk of Yonkers being prejudiced automobilists. They welcomed lists to the town, recognizing that ıght life and business to the place, were convinced that the automo- the coming vehicle. "But the lists must not endanger the life of our citizens. I don't want to there are any measured off for timing, but we are perfectly ɪf enforcing the law in the town, ıve a large police force, mounted .d bicycle patrol, and a very com- stem of police telegraph. The n step into any telegraph office nunicate with the central office or r office, and we have also com- n with other towns; so that even :nder should get beyond our town thout being apprehended he would eyond the reach of the law. On r hand, we will use these same the interest of the automobilists, ıy of them should ever be in dis- ɔur streets and need help our sys- ommunication is at their disposal, be used for their benefit. As I ere is absolutely no prejudice ıutomobiles here, and the orders ıve been issued with regard to the ıent of the speed ordinance apply ısses of vehicles."

ıffalo, N. Y., an ordinance has bmitted requiring every operator ıtomobile to pay a license fee of n annual fee of $2. Every license is to be numbered and must be produced on demand of the police. Every owner must have his license number on his automobile. The license is subject to forfeiture in case three convictions for violating the ordinance are made within a year, and any driver who has forfeited his license shall be ineligible for another within two years from the date of forfeiture.

Five drivers for the New York Electric Vehicle Transportation Company were placed under arrest by the park police last week for failure to comply with the State law requiring the initials of the owner of an automobile to be conspicuously displayed on the vehicle. Some of the company's cabs are rented privately by the month, hence they claim these are not amenable to the ordinary hack law, nor are the vehicles owned by individuals. The case has been submitted to the corporation counsel.

Regarding the suit brought against the Knox Automobile Company by Alvin Townsend, President Smith, of the Knox Company, states that the complainant bought an old style three wheeler a year or two ago and now wants a new machine or his money back, as he claims that the machine would not climb the hills. They had in no way warranted the machine sold nor do they warrant any machine they sell. They will not return the money, as they do not do business that way and will fight the case to the end.

Foxhall Keene Fined for Speeding.

In the justice's court at Oyster Bay, L. I., on November 18, Justice Franklin fined Foxhall P. Keene, a well known sportsman, $20 for driving a motor vehicle faster than the legal speed limit of 20 miles per hour on November 11. The Long Island Highway Protective Society, whose timers timed Mr. Keene's vehicle over a course of one-eighth of a mile, was represented by George B. Stoddart, who also appeared for the district attorney's office, the plaintiff in the case. Witnesses for the society testified that the defendant had driven his car over the course in eighteen and one-half seconds or at the rate of 24.3 miles per hour.

Just before the spot where the measured course begins there is a slight up grade about 100 feet long. Further on the road is down hill for a distance of approximately 600 feet. The measured course is practically level. Counsel for the plaintiff held that the machine must have reached the foot of the 100 foot incline at a high rate of speed and that this short grade did not retard the vehicle much after it had traveled down the relatively much longer hill.

The automobile in question was a Renault tonneau, rated at 6 horse power. On the witness stand several motorists acting as experts swore that the car could not cover more than 20 miles an hour on the level, even when in perfect condition.

Annual Report of the Good Roads Committee of the A. C. A.

(Report to the Governors of the Automobile Club of America, by A. R. Shattuck, President of the Good Roads Committee.)

As a member of your good roads committee I attended the third annual Good Roads Convention, held at Albany, on January 28 and 29, 1902. This convention is made up from delegates from the boards of supervisors throughout the State. I was particularly struck with the earnest endeavor on the part of this convention to improve the condition of our roads in New York. The convention directed its law committee to prepare two important bills:

First—That the present system prevailing in many towns where the roads are worked by a day labor tax assessed upon farmers be done away with and that the road tax be collected in money.

Second—That the State bond itself for $20,000,000, the proceeds to be used under the present Higbie-Armstrong law in building State roads.

Bills as above were introduced in the Legislature, but were not passed because of the early adjournment of that body. They, however, had an excellent effect upon other legislation then pending. At the last session of the Legislature the Plank bill was passed, which provides that any town abandoning its labor system and collecting the road tax in money shall have added to the amount so collected a premium of 50 per cent. in money by the State. The Armstrong bill provides that if the counties fail to take care of State roads, allowing them to fall into disrepair, the work may be done by the State Engineer and charged to the county.

This convention also had a most excellent effect upon the annual appropriation under the Higbie-Armstrong bill, and the State's share was increased to $795,000, which with an equal amount to be added by the towns and counties made the last year's appropriation for State roads $1,590,000, sufficient to build 200 miles of stone highway. The work of this convention was so important that the United States Government published the proceedings in full, and a copy of them has been sent to each member of this club.

The State Engineer, Mr. Bond, under date of November 12, 1902, writes:

"The amount of State road completed to date is about 356 miles. There are a number of roads which are so near completion that we hope to have them ready before frost, but our work has been greatly hindered by the continuous rains throughout the season.

"The amount of road in process of construction is about 200 miles.

"The amount of road surveyed in excess of the above 356 miles is about 750 miles.

"At the present writing plans have been approved for eighty-two roads, covering about 310 miles, at a total estimated cost

of about $2,600,000, of which the counties have contributed their half.

"The total mileage for which petitions have been received is approximately 1,900 miles; new petitions are coming in fast now.

"Out of the total moneys which have been appropriated by the State 356 miles have been completed and are in process of construction. No further roads can be taken up for consideration until the Legislature makes another appropriation. The counties have already appropriated $1,300,000, and before the Legislature adjourns it seems quite probable that this amount will reach $2,000,000."

It is the opinion of your committee that there is no better work for the club than the encouragement of the building of State roads. We have now in Westchester County under construction two lines of roads, one of which extends from White Plains to the northern boundary of the county, and the other which extends along the Sawmill River from Woodland to the northern boundary of the county, which it is expected will be completed next spring. They cover something over 60 miles. Another road has been surveyed running east and west along the northern boundary of the county, but this has not yet been accepted by the board of supervisors and will not be completed for a year or two. Two roads connecting with the two first named have been surveyed, running north and south right through the eastern portion of Putnam County. They have not yet been accepted by the board of supervisors of that county and cannot be completed for a couple of years. Your committee is endeavoring to have these roads built and also to have this line of good road extended through Dutchess County along the line of the Harlem Railroad.

There will be another Good Roads Convention at Albany in January, at which we should be represented and at which the bonding scheme will be strongly urged. An annual appropriation of three-quarters of a million or a million on the part of the State is very well, but it brings us our good road too slowly.

A road has been built around Nelson Hill in Putnam County. This hill was almost impassable to any but a high power automobile. This road was built by subscription by Mr. William Church Osborn, and the club contributed the sum of $250. It is now possible for a moderate power automobile to make the trip up the Hudson River on the east bank.

The conditions of the roads leading into this city is most unsatisfactory and disgraceful. We have done everything that we could during the past year to improve them, but there seems to be a want of money, a want of judicious expenditure of what money is spent and a want of knowledge of how to do the work in the best and most economical way.

Your committee early last February, in connection with the Associated Cycling Clubs and the Road Drivers' Association, had a hearing before Mr. Cantor, President of the Borough of Manhattan, and Mr. Haffen, President of the Borough of Bronx. They pointed out to them the necessity for improving certain highways in this borough and in the Bronx, so that there could be two through roads, one on the east side and one on the west side, between this city and the country lying north of it. We are sorry to report that comparatively little has been done in improving the roads named.

In the Bronx Sedgwick avenue has been resurfaced and a little work has been done on Jerome avenue; but the crosswalks on Jerome avenue have not been removed, and no matter how the macadam on that avenue is built up so as to be level with the crosswalks it soon wears down and we have to bump over these crosswalks in a way which is not only disagreeable but dangerous, because of the liability of breaking the vehicle.

Your committee had a number of interviews with Mr. Cantor on this subject and has carried on a very active correspondence with both Mr. Cantor and Mr. Haffen, but the result achieved has been most disappointing.

The governors of the club recently appointed Mr. Jefferson Seligman, General George Moore Smith and your president as a special committee to try and improve the condition of the roads leading into this city. Your committee had a number of photographs taken of the condition of these roads and has submitted the same to the mayor of the city. He said that he really had no jurisdiction in the matter, that this rested entirely with the presidents of the boroughs. He, however, suggested that if a letter was written to him specifying the condition of these roads he would lay the matter before the presidents of the boroughs and try to have them improved. This has been done.

We are glad to report that the worn out Belgian block pavement on the main street of Long Island City is being replaced with asphalt between Thirty-fourth street ferry and the commencement of Hoffman boulevard; it has been torn up to put down a sewer, and your committee has brought all the pressure possible to bear upon Mr. Cassidy, president of the borough of Queens, to compel the contractor to replace the macadam. Mr. Cassidy has promised to try to do this, but says the only means he has in his power is to hold up the payments to the contractor. This is being done. Meanwhile the condition of this portion of the Hoffman boulevard is most unsatisfactory. Unless the macadam is replaced this autumn next spring this road will be impassable. There are now two very dangerous holes in the road, into one of which an automobile recently fell, with the result that one of the men has lost his leg and another has a broken limb.

The goods roads movement is spreading and broadening rapidly in Massachusetts, in New Jersey and in this State, and I venture to predict that it will only be a few years when the statesmen and politicians throughout this country of ours will be forced by the demands of their constituents to build and maintain good roads throughout the entire country, but the people themselves have much to learn in knowing how to care for, keep in repair and use improved highways.

A. C. A. Reliability Run Discussion.

The Automobile Club of America held the first of its series of "Tuesday Talks" contemplated for the coming winter at the clubhouse on Tuesday evening, November 11. The evening was occupied by a discussion of the recent reliability contest. Winthrop E. Scarritt, president of the contest committee, presided in the absence of President Shattuck.

Mr. Scarritt opened the discussion by congratulating the contestants and the manufacturers whose vehicles ranked high in the final classification. Comparing the trial with the one held in England recently, he said that the conditions had been slightly severer there, tire stops having been penalized. But even if tire stops had been penalized in the American contest there would still have been eight perfect scores as compared to two in the English trial. Mr. Scarritt announced that the final results would soon be published in pamphlet form, so as to give the very successful trial the publicity it deserved. The present number of automobiles in use in this country the speaker, from reports received, estimated at 15,000. The manufacturers, he said, were figuring on an output of 35,000 the coming year, so that there should be 50,000 in service before 1904. Mr. Scarritt also drew attention to the great field for automobiles in commercial lines and expressed the opinion that eventually the horse would be banished from the street by the motor vehicle.

In future contests the times for each stage should be posted at the noon and night controls, which would furnish official news to the newspapers each day, and prove generally beneficial. Another plan advocated by Mr. Scarritt was that at the conclusion of the contest the competing cars should be exhibited to possible purchasers. Mr. Scarritt then called attention to the difficulties met with by the committee in formulating rules for a contest of this kind and called upon the members present for suggestions for future contests.

S. T. Davis, Jr., did not approve of the "official observer system." He suggested that competing cars be started with instructions to go to a certain point and return, and that upon the return the vehicles should be examined with respect to their condition. He mentioned that in the

ıhol contest in France only two
ut of a total of thirty were given
d, and eight for appearance and

Riker favored a higher speed
future contests and thought that
to Boston should be made in two

Chapin suggested a contest com-
daily runs in different directions
city, followed by a track race of
ıpeting vehicles, with the same
d equipment. One of the daily
he said, might lead to Staten
ıne up New York State, another
ong Island, etc., and the race
: held on the Brighton Beach or
her track in the vicinity of New
y. He thought that nothing was
ined by organizing any more con-
ı a 14 mile speed limit.

Birdsall also favored speed con-
thought that a road race to Chi-
St. Louis, with the roads properly
would satisfy one of the great
the automobile industry.

ors at the Madison Square Garden Show.

tal list of firms which have taken
· the next New York show com-
4 names, the following in addi-
hose given in our issue of Octo-

Park Row Bicycle Company,
rk.

J. Tire Company, Indianapolis,

eth Century Manufacturing
r, New York.

Motor Vehicle Company, New

l Automobile and Manufacturing
r, Cleveland, Ohio.

Motor Vehicle Company, Pough-
N. Y.

upply Company, New York.

ion Manufacturing Company,
L

Bowman Automobile Company,
rk.

al Vehicle Company, Indianapo-

ear Tire and Rubber Company,
)hio.

n-Peters Air Pump Company,
rk.

rthol Brazier, Philadelphia, Pa.

a Motor Company, Syracuse,

y Motor Vehicle Company, Syra-
Y.

eardsley & Rubbs Manufacturing
r, Shelby, Ohio.

L. Smith, Boston, Mass.

. Franklin Manufacturing Com-
racuse, N. Y.

c Automobile Company, De-
ich.

l Automobile Company, New

Kenneth A. Skinner, Boston, Mass.

Conger Manufacturing Company, Croton, N. Y.

The F. B. Stearns Company, Cleveland, Ohio.

Apperson Brothers, Kokomo, Ind.

Buckmobile Company, Utica, N. Y.

Sintz Motor Car Company, Limited, Grand Rapids, Mich.

American Georges Richard Company, New York.

Warwick Cycle and Automobile Company, Springfield, Mass.

Motor Cycle Manufacturing Company, Brockton, Mass.

H. H. Woodard, Houlton, Me.

Hall Motor Carriage Company, Dover, N. J.

Lindsay Automobile Parts Company, Indianapolis, Ind.

Wheel Within Wheel Company, New York.

Standard Anti-Friction Equipment Company, New York.

The Meriam-Abbott Company, Cleveland, Ohio.

A. Clement Cycle Motor and Light Carriage Company, Hartford, Conn.

Elmore Manufacturing Company, Clyde, Ohio.

Julian F. Denison, New Haven, Conn.

Report of Contest Committee.

The contest committee of the A. C. A. presented its report on the recent New York-Boston and Return Reliability Contest at a meeting held at the clubhouse on November 17. This report is now in the hands of the printer and will be out in about a week. The committee made numerous recommendations for changes in the rules of future trials, some of which are as follows: Observers should be changed each day; price should be considered in the classification; no certificates should be awarded, and medals should be given in place of cups; the competition for first arrival at controls should be discouraged; non-stop records should not be emphasized; time allowances should not be made; the conditions should be made as closely those of general touring as possible, and after the contest the vehicles should be exhibited in the condition of their arrival for four days.

The Chicago Show.

The following changes have been made in the allotment of space at the Chicago show: The Berg Automobile Company will occupy 29 and 30; Apperson Brothers, 31 and 32; Knox Automobile Company, 45 and 46; Elmore Manufacturing Company, 47 and 48, and the Stevens Arms and Tool Company, 86.

The following additional allotments have been made: Lindsay Automobile Parts Company, space 94 in addition to 93; Frank P. Illsley, 97 and 98; Marble-Swift Automobile Company, 99; Kirk Manufacturing Company, 100; Hartford Rubber Works Company, 106; Jackson Automobile Company, 108 and 109; Woods Motor Vehicle Company, 114 to 117; Electric Contract Company, 122; Electric Storage Battery Company, 123; Brennan Motor Company, 135; Kammann Manufacturing Company, 137, and the Motor Development Company, 157.

It is reported that all spaces except 143 and 158, both of which are small, are taken.

A. A. A. Meeting.

The A. A. A. held a meeting on November 17 at the A. C. A. headquarters, 753 Fifth avenue, New York, at which the work accomplished by the association during the past year was reviewed and plans discussed for the coming year. A special meeting will be held December 9.

The Cleveland Automobile Club was admitted to membership and applications were received from the San Francisco and the North Jersey clubs.

Sign Post Work.

Under the auspices of the Automobile Club of America, A. Ward Chamberlin, chairman of the sign post committee, has been erecting along the Hudson County boulevard a large number of enameled iron signs directing automobilists to the various ferries and adjacent cities.

Automobile Accidents.

The automobile of Arthur Dumas, Manchester, N. H., started accidentally the other day while the owner was making a slight repair underneath. The machine ran over him, threw out a friend who was riding with him, caused a runaway and then came into collision with a wagon, capsizing and taking fire. Luckily no serious damage was done.

The report that an automobile running at 40 miles an hour collided with a carriage containing three men, near Englewood, N. J., last week, and critically injured all of them is an exaggeration. A horse bolted at seeing an automobile, tipped over a carriage and slightly injured one of the occupants.

Books Received.

The Automobile: Its Construction and Management. By Gérard Lavergne. Revised and edited by Paul N. Hasluck. With 536 illustrations. Price, $4.50. Published by David McKay, Philadelphia.

Ignition Devices for Gas and Petrol Motors. By S. R. Bottone. Ninety-two pages, sixteen illustrations. Price, 2s 6d. Published by Guilbert Pitman, Cecil court, Charing Cross road, W. C., London.

Reviews will appear in a later issue.

MINOR MENTION

The Spaulding Automobile Company, Buffalo, N. Y., are building a $1,200 tonneau.

Florey & Brooks, Scranton, Pa., have opened a training school to break horses to the automobile.

The Cadillac Automobile Company, Detroit, Mich., has increased its capital stock from $60,000 to $300,000.

The Automobile Club of Kansas City has adopted a constitution and bylaws and chosen a club room.

The Smith Company, Topeka, Kan., is building a small automobile factory at Tenth and Jefferson streets.

An automobile show will be held at Washington, D. C., next spring by the Washington Automobile Dealers' Association.

M. L. Blanchard has been elected president and L. H. Kittredge secretary of the Peerless Motor Car Company, Cleveland, Ohio; capital stock, $300,000.

The American Machine Manufacturing Company, Boston, Mass., have secured a factory at Braintree and will engage more extensively in the manufacture of auto parts.

The men who drive the motor stages of the Interstate Transit Company across the Eads bridge from East St. Louis to St. Louis are said to have organized a union.

The Cleveland Automobile and Supply Company, Cleveland, Ohio, will erect a new storage, livery and repair station on Vincent street. The building will be 75x152 feet and two stories high.

The Russell Motor Vehicle Company has been organized under Arizona laws with $1,000,000 capital by E. L. Russell, C. E. Thompson and P. L. Russell. A new hydrocarbon gas will be exploited.

W. E. Morrison, manager of the Dow Portable Electric Assistant Company, Boston, Mass., was taken suddenly ill in New York city while returning from a Western trip, and died November 10 of bronchitis, after an illness of only a few days.

The newly organized Star Automobile Company, Cleveland, Ohio, has chosen the following officers: H. H. Hodell, president; J. A. Mathews, vice president; W. A. Dutton, secretary-treasurer; J. H. Van Dorn, E. I. Leighton and F. Schneider directors. Operations will be begun at once.

Advices from Waterloo, Ia., indicate that the proposals of the Duryea Motor Company for a change of location from Reading, Pa., to Waterloo are meeting with favor. The new organization, which which will take in the Waterloo Gasoline Engine Works and the Davis Gasoline Engine Works as well, will be called the Waterloo Motor Works and will have a capital of $200,000, of which $150,000 will be paid in.

James W. Lathrop, Mystic, Conn., contemplates extending his business to include the manufacture of automobiles.

The plant of the Remington Automobile and Motor Company, Utica, N. Y., has been closed.

The report that Raymond Brothers, South Norwalk, Conn., had ordered six steam trucks for use in their business is untrue.

John M. Schmidt, Harry H. Picking and Cleveland V. Chidis, Orange, N. J., have organized the Orange Automobile Company with $100,000 capital stock.

The Chaney Automobile Transfer and Storage Company, Terre Haute, Ind., has been organized with John S. Cox as president and A. Chaney vice president and manager.

The Smith & Mortensen Company, of New York, has been formed with $15,000 capital by C. R. Smith, of Brooklyn, and George Mortensen and W. L. Cohn, of New York, to engage in the automobile business.

The J. S. Leggett Manufacturing Company, Syracuse, N. Y., whose incorporation was announced in our last issue, will manufacture two, four and six passenger machines with French type of body. Two cylinder motors will be used in the larger machines. The first car is promised about February 1.

The new station of the Harvard Auto Company at Quincy square, junction of Massachusetts avenue and Bow street, Cambridge, is almost opposite the Harvard College grounds, and many of the students have their autos stored there. The new quarters will hold about 100 machines. A large repair shop is directly off from the main floor and on the other side is a large washstand capable of holding the largest touring car. William E. Furniss is in charge of the station.

B. V. Covert & Co., of Lockport, N. Y., are about to place on the market a light chainless touring car, equipped with a 5 horse power motor, the whole weighing only 600 pounds. The motor is of the prevailing French pattern, with the transmission gear attached direct to the motor, and enclosed in a dust proof, oil tight aluminum case. The rear axles are driven with a bevel gear, and the transmission gear is so designed that the motor drives direct on the high speed. The range of speed will be from 6 to 30 miles an hour.

At the recent annual election of the Springfield Automobile Club H. G. Fiske was re-elected president, and other officers were chosen as follows: First vice president, Dr. W. R. Weiser; second vice president, Dr. A. O. Squier; third vice president, A. P. Smith; fourth vice president, I. H. Page; secretary, F. A. Hubbard; treasurer, F. S. Carr; directors, Dr. H. C. Medcraft, Dr. H. C. Martin, Harry A. Knox, J. Frank Duryea, Adolph Geisel, S. L. Haynes and W. M. Remington. Six new members were elected.

A special automobile speedway across the Jersey Meadows was suggested by Gen. Roy Stone at the recent Tuesday evening talk of the A. C. A.

An automobile station will be erected at the northeast corner of Rockwell and Wood streets, Cleveland, Ohio, by the White Sewing Machine Company.

Oldsmobiles now being shipped are fitted with the improved carburetor or mixer which is said to have been used on the carriages which made so good a showing in the recent Reliability Run. Both front and rear axles are trussed.

The Neustadt-Perry Company, of St. Louis, Mo., have built a special running gear for a mail contractor in Texas for carrying the mails, six passengers and some baggage. We are informed that a trip of 69 miles each way is being made daily with this vehicle.

W. D. Gash has been elected general manager of the Fournier-Searchmont Automobile Company, and the following board of directors has been chosen: President, G. Blum, of Blum Brothers, Philadelphia; secretary and treasurer, Barclay H. Warburton, proprietor of the Philadelphia *Evening Telegraph;* Thomas B. Wanamaker, Edward M. Robinson, of Drexel & Co., Philadelphia; E. R. L. Gould, Spencer Trask and Acosta Nichols, of New York. L. S. Chadwick will continue as superintendent and C. W. Rowe assistant superintendent.

The Beardsley & Hubbs Manufacturing Company, Shelby, Ohio, has changed its name to the Shelby Motor Car Company. Fifteen directors have been chosen as follows: Mr. Jackson, of Cleveland; Mr. Forbes, of Chillicothe; Mr. Frantz, of Sandusky, and the following from Shelby: V. S. Beardsley, Mr. Sanderson, Willard Cockley, J. C. Fish, Jonas Feighner, Henry Wentz, H. W. Hildebrant, W. W. Skiles, G. M. Skiles, Frank Brucker, Edwin Mansfield and J. A. Seltzer. The directors organized by electing the following officers: J. C. Fish, president; Mr. Jackson, of Cleveland, vice president; V. S. Beardsley, treasurer and general manager; Mr. Sanderson, secretary. An executive board was also chosen, consisting of Messrs. Fish, Jackson, Beardsley, Sanderson, G. M. Skiles and Mansfield.

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Doctors' Number.

present indications our Doctors' of January 7 will be the most pecial we have ever issued. It al not only to the practicing who is thinking of replacing his ith an automobile, but will be interesting to any intending pur- r the information it will contain e wisdom of experience gained in lay use of automobiles under the ng and most varied conditions. ian thirty to forty contributors in all parts of the country will be represented in its pages, thus affording the reader the greatest variety of interesting incidents and serving as a valuable guide to contemplating purchasers whatever the nature of the service they may require of an automobile.

To advertisers we desire to state that not less than 2,000 copies over and above the usual edition will be printed, bringing the total up to 7,000 at least. The extra copies will be sold to medical men all over the United States. Hence the major part of this surplus edition will go directly into the hands of persons interested and contemplating the purchase of automobiles. We believe it is not too much to say that hundreds of thousands of dollars' worth of automobiles will be sold through this number alone.

Gyrostatic Action.

The article by Mr. Stoddard, in another part of this issue, offers a very interesting explanation of certain phases of the subject of skidding. The skidding effect with automobiles is sometimes so exaggerated in relation to the apparent causes that there has long been a suspicion that some inapparent cause was at work contributing largely in producing this effect. And it appears from the figures presented by Mr. Stoddard that this inapparent cause is gyrostatic action.

To the lay mind the action of the gyrostat, apparently defying the law of gravitation, is one of the mysteries of nature. Mathematically this action is easily elucidated, however. While, therefore, the explanation furnished by the author may not succeed in clearing up the lay mind as to the rationale of skidding, it is likely to lead to some practical remedy or preventive of skidding (that due to this cause at least), and one such preventive is pointed out by the author in the conclusion of his article.

The essence of Mr. Stoddard's theory is that if one of the rotating parts of the machine suddenly rises or drops, due to inequalities in the road, the gyrostatic properties of this part give it a tendency to rotate around a vertical, or nearly vertical, axis, and thus cause the vehicle to slew around. If the flywheel rotates in the same direction as the driving wheel, the effect of its gyrostatic properties will add to that of the wheels, whereas the two effects will partially neutralize each other if the directions of rotation of flywheel and road wheels are opposed.

It is to be hoped that this investigation will be pushed further, and that the evil of skidding may, in consequence, be dealt with more effectively in the future.

Motor Bicycle Front Forks.

The weakest point of most motor bicycle frames is near the crown of the front forks, and a number of serious or fatal "falls" that have occurred were due to the forks breaking at this point. We have repeatedly pointed out that ordinary bicycles are not nearly strong enough to sustain the added dead weight of a gasoline motor, and the extra vibration due to greater power and higher speed; and in such "transformed" bicycles a collapse of the front fork may be expected. But even in specially designed motor bicycle frames the front fork is not always given the strength desirable. If the forks are double the weakest point is generally in the tube just above the crown of the fork. It would seem that in view of the importance of this part with regard to the safety of the machine some form of truss outside the steering tube head should be employed, in order to secure the necessary strength without an undue amount of material.

Good Roads Work.

According to the report of the good roads committee of the A. C. A., published in our last issue, in the State of New York there will be expended for the im-

provement of the public roads during the coming year the sum of about $4,000,000, one half of this amount having been appropriated by the county boards and the other half by the State. Such a substantial appropriation for road improvement is unprecedented in the history of the good roads movement in this country, and a good deal of the credit for the enormous impetus it is now receiving in New York State is due the Automobile Club of America and its good roads committee.

The committee was represented at Albany several times last winter when the State Legislature was occupied with the framing of road improvement laws, and it has also used its influence with county boards in districts frequented by automobilists where there existed exceptionally poor stretches of roads, dangerous passages, etc. In most cases its efforts have been rewarded with success beyond expectation, showing that the rural districts are at last fully awake to the need of road improvement.

In no other way could the Automobile Club so well redeem its pledge of seeking "the encouragement and development in this country of the automobile as by these efforts in behalf of good roads. The results, as far as the automobile industry is concerned, may be less immediate and less startling than those of some other methods that might be devised, but for the very same reason they will be far more lasting and substantial. The automobile is, after all, dependent upon good roads—the better the road the more satisfactory and successful its use. For this reason the improvement of the roads must keep pace with the introduction of the automobile, and it is to be hoped that the good example set by New York will be imitated by many other States.

The Contest Results Incorrectly Interpreted.

Commenting upon the recent New York-Boston and Return Reliability Contest the *Autocar* says:

"A bad defect in the rules, from a reliability point of view, was that any time lost in penalized stops could be made up by fast running, as the rules indicated that such stops would be counted in the running time. * * * The rule was unquestionably a foolish one, as from the detailed reports it seems that nearly every vehicle gave more or less trouble, yet there are about a dozen claimants for the President's cup for having made perfect runs."

For the information of our contemporary we would point out that the rule referred to had absolutely no effect upon the number of contestants which qualified for the President's cup. None of these vehicles had any stop due to attention required by any part of the vehicle with the exception of the tires, and hence there could in their case be no question of making up time lost in penalized stops by speeding. The cup awards were made upon the basis of reliability marks earned, and, of course, any marks lost by stops for repairs could not be regained by speeding.

The average speed, the factor upon which the awarding of certificates was based, was, however, affected by this rule. Penalized stops did not prevent any contestant from making an average speed equal to the maximum recognized by the committee. And herein lay the fault of the rules. There would undoubtedly have been a few less first class certificate winners if it had not been for this rule.

The seventeen vehicles which qualified for the President's cup had absolutely no stop from any other causes than those not penalized according to the rules. And it is stated by the officials of the contest that even if tire stops had been penalized there would still have been eight clean scores. We hope that our contemporary will correct its statement above quoted in justice to the American automobile industry.

Terminology.

During the last year the English term "car" has gained much headway in American automobile circles, especially the compound, "touring-car." Even "motor-car" occurs now and then in the names of newly organized companies. Whether the term 'car" will be definitely adopted here to the exclusion of "automobile," which is of French origin, remains to be seen. The former has the advantage of being short, which commends it for conversational use, but, on the other hand, it is less definite; as in this country it designates different kinds of vehicles which would not come under the head of automobiles. Confusion is constantly arising owing to the varied use of the term "motor-car," and the English automobile press has on several occasions made complaints of the incorrect use of the term in the daily press. For instance, when President Roosevelt's carriage was run into by a trolley car the news was heralded in one of the English dailies as a motor-car accident. And this week, again, the recent speed tests on the Berlin-Zossen experimental electric railroad are reported under "Remarkable Motor Car Record."

The term "car" has the advantage that it is of Anglo-Saxon origin, and "motor" is also in common use in English speaking countries. This fact will, no doubt, strongly influence the adoption of these words in motor vehicle terminology, for there seems to be a growing sentiment against the use of foreign words. As an illustration, in Kansas City during the discussion of the automobile speed regulations before the city council one of the aldermen insisted that men in charge of motor vehicles should be referred to as operators instead of chauffeurs.

The Directional Tendency of the Inertia of the Flywheels and Vehicle Wheels.

By E. J. Stoddard.

Can such things be,
And overcome us like a summer cloud,
Without our special wonder?

If a force is applied to a spinning wheel so as to turn it about an axis at right angles to the shaft, it will tend to turn the rotating wheel about an axis at right angles to the shaft and to the first mentioned axis.

THE REASON.

Fig. 1 represents a wheel turning in the plane of the paper in the direction of the arrow around the shaft 1. Suppose a force, or couple, applied to give the wheel a rotation about the axis 2 2, so as to bring the upper part toward the observer and cause the lower part to recede.

Each part of the wheel in the first quadrant is receding from the axis 2 2, because of the motion of rotation around 1, and its velocity, due to the rotation about 2 2, is therefore increasing, and its inertia causes a force resisting this acceleration. The resultant of all these forces is a force at some point *a*, away from the observer. Indicate its direction by the sign +.

In the second quadrant each particle is having its velocity retarded because it is approaching the axis 2 2, and the resultant is a force at *b*, toward the observer. Indicate its direction by the sign —.

In the third quadrant, which is moving away from the observer because of the rotation around 2 2, each particle is being positively accelerated and the resultant of the inertia forces is a force — *c*.

In the fourth quadrant each particle is being retarded and the resultant is a force + *d*.

Now we have the two symmetrically located forces *a*, *d*, away from the observer, and the two symmetrically located forces *b*, *c*, toward the observer.

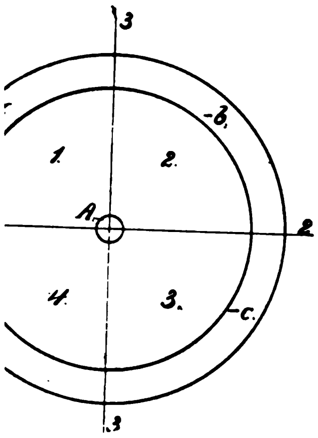


FIG. 1.

l evidently tend to produce a
ut the axis 3 3, that will bring
and portion of the wheel to-
bserver and the left hand por-
rom the observer.

A. M. Worthington's book,
of Rotation" (Longmans,
o.), a formula for the magni-
couple around 3 3 is given,
be put in the form,

tatical foot pounds) $= \frac{W}{32} k^2 n v$,

' is the weight of the wheel in
the radius of gyration in feet;
ılar velocity of one rotation,
angular velocity of the other

APPLICATION.

ain automobile engine the two
veigh 250 pounds, and their
ation are about 9 inches = ¾
s consider this engine mounted
riage having 30 inch wheels
pounds each, a wheel base of
ead of 4 feet 8 inches. The en-
ning at 600 revolutions per
driving the carriage at the rate
per hour.

wheel is turning 600 times per
10 times per second), its angu-
n is $2\pi + 10 = 62.832$ radians
The circumference of the car-
s is $2.5\,\pi = 7.854$ feet, and as
is running at the rate of 20
our

$\frac{180}{0} = 29\frac{1}{3}$ feet per second,

making

$= 3.735$ revolutions per second

its angular velocity is there-
$\times 2\pi = 23.47$ radians per sec-

pose there is a hummock in
tracks that has a rise of 7
21 inches. A wheel will be
ıds in rising 7 inches, which
he tipping of the carriage, or
about a radius of 56 inches at

$= 117$ inches per second,

angular velocity of

$\frac{117}{56} =$ about 2 radians per second.

It may be that these conditions would occasion a disaster, but they will serve for an illustration.

Now we have precisely the conditions of Fig. 1. The front wheels are tilted in the first place. These together weigh 100 pounds. We may consider their radius of gyration to be about

$\frac{30}{2} - 1.5 = 13.5$ inches $= 1.125$ or $\frac{9}{8}$ feet.

Substituting in the formula, we have

$$\text{Torque} = \frac{100}{32}\left(\frac{9}{8}\right)^2 \times 23.47 \times 2$$
$$= 185.6 \text{ statical foot pounds}$$

tending to turn the steering wheels about their pivots, as indicated in Fig. 2. That is something over 185 pounds applied one foot from the pivot, as indicated by the straight arrow and acting to turn the wheels as indicated by the curved arrows. If this is resisted by the steering handle it tends to turn the whole vehicle about its centre of gravity in the direction indicated by the arrows.

In any case, because of the lost motion in, or yielding of the steering gear, it would probably act to turn the steering wheels more or less, so as to start the carriage to turning.

About $6 \div 29\frac{1}{3} = .21$ second after the front wheel has risen upon the hummock the hind wheel strikes it. We have then a torque of 185.6 statical foot pounds, due to the hind wheels, and if we neglect the effect of the springs and consider that the two flywheels are turning in the same direction as the driving wheels, we have to add the twisting effect of the flywheels (substituting in the equation)

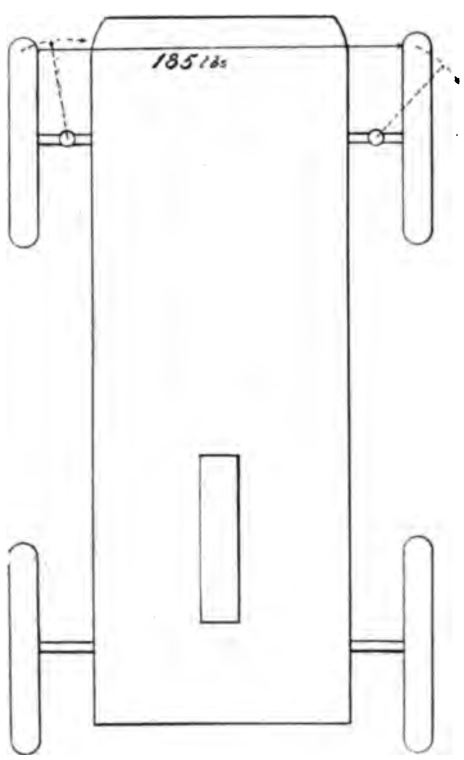


FIG. 2.

$$\frac{250}{32}\left(\frac{3}{4}\right)^2 62.832 \times 2 = 552.2 \text{ statical foot lbs.},$$

which makes the entire torque 552.2 + 185.6 = 737.8 statical foot pounds, or a force of nearly 738 pounds applied upon a lever 1 foot long, and tending to turn the carriage as indicated by the straight arrow in Fig. 2. If the front wheels have already started this motion, or if they are not firmly on the ground, this should be quite sufficient to turn the vehicle suddenly at right angles to its course.

If the flywheels of the engine were revolving in the opposite direction to the driving wheels, the twisting moment or torque would be only 552 — 185 = 367 statical foot pounds, or about half what it would be in the first case, and in the opposite direction—that is, so as to oppose the supposed deflecting action of the steering wheels.

SECOND CASE.

Suppose the vehicle to be rounding a curve so that it turns at right angles to its first direction in two seconds.

If the flywheel is turning in the same direction as the vehicle wheels, we have to add the effect of all four wheels and the flywheel. It is rounding the curve at such a rate as to change the plane of rotation of the wheels at the angular velocity of

$$\frac{\pi}{2 \times 2} = \frac{3.1416}{4} = .7854 \text{ radians per second.}$$

This would cause a torque of

$$\frac{200}{32}\left(\frac{9}{8}\right)^2 23.47 \times .7854$$
$$= 145.8 \text{ statical foot pounds}$$

due to the vehicle wheels, and

$$\frac{250}{32}\left(\frac{3}{4}\right)^2 62.832 \times .7854$$
$$= 216.9 \text{ statical foot pounds.}$$

due to the flywheels, or an aggregate of 216.9 + 145.8 = 362.7 statical foot pounds. This tends to lift the inner wheels from the track and to assist the tendency of the centrifugal force to capsize the vehicle. If the flywheels were turning the other way there would be a torque of 216.9 — 145.8 = 71.1 statical foot pounds, acting against the centrifugal force, or the flywheels would exert a torque of 217 statical foot pounds to keep from capsizing.

In automobiles in which the flywheels turn in a transverse plane the tendency is to raise and lower the ends when rounding a curve, and there is no effect due to the wheels on one side passing over an obstacle.

Alternating Current Ignition.

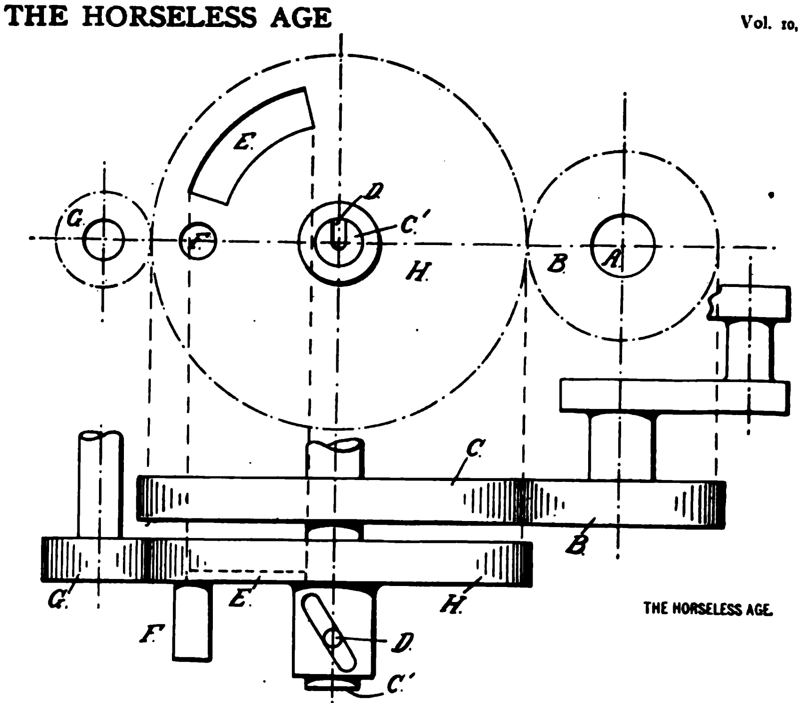
By C. C. Bramwell.

Some weeks ago I made the suggestion that the use of an alternating current generator, combined with a transformer, offered a promising field for investigation with regard to ignition purposes on internal combustion motors. The subject has been of sufficient importance to call forth an editorial and also an article from

Mr. Clough, in which certain drawbacks to the system have been pointed out. Having gone into the matter to a considerable extent, on paper, I had previously run foul of most of the difficulties mentioned and believe they are quite easily overcome, if approached from the proper standpoint.

In this article I will try to show how the difficulty mentioned by Mr. Clough, that the spark period of the alternator may get out of phase, so to speak, with the motor, can be provided against. In the first place, however, let me say that Mr. Clough has put the matter in rather its worst light by assuming an engine speed of 1,000 revolutions per minute and a generator speed of only 2,000 revolutions per minute. Now, I have repeatedly run generators for protracted periods at 4,500 revolutions per minute without any harm whatever. Moreover, 1,000 revolutions per minute is beginning to be considered too high a speed for reciprocating motors, except on very rare occasions. It is likely that the future tendency will be toward even slower engine speeds than are common at present; 600 revolutions per minute will, in all likelihood, be considered the maximum average speed of such motors before long. For the sake of argument, we will adhere to the 1,000 revolutions per minute, as already suggested, but will suppose the generator driven at a speed multiplication of four to one of the motor. This will give us a maximum variation of 15 degrees on the motor crank shaft in the position of the spark, provided the generator is friction driven, or provided its speed is controlled by a governor pulley, or other device, allowing the generator to assume a relatively different position to the motor crank shaft from time to time.

On the other hand, suppose we dispense with both governor and friction drive and suppose we adopt instead a positive gear drive, the transmission ratio of which is a multiple of two (so as to insure the generator armature maintaining a given relation with the motor crank shaft, assuming a six pole generator). It is evident that if the generator armature is set so that its discharge position corresponds with the dead centre position of the engine, whatever the speed of the motor, the armature will always bear the same relation to the field poles of the generator, and the spark will take place on the dead centre of the motor. What is now desired is to find some means of advancing or retarding the spark point, with relation to the cycle of the motor. This cannot be done by simply advancing the timing, or commutating arrangement, as in direct current apparatus, for in this case the armature of the generator must be advanced, or retarded, simultaneously with the commutating device, and also to the same degree. If this is done the first spark will take place exactly at the desired point, while the second and third sparks will follow at periods of 15 degrees apart.



Timing Gear.

The following rough sketch will show one way in which this advancing or retarding effect may be produced in a simple and effective manner.

It is to be understood that the sketch shown is only diagrammatical and is not intended to show the final form of arrangement so much as to illustrate the method to be employed to accomplish the desired result. Referring to the sketch, wherein A is the motor crank shaft; B, the gear driving the cam shaft; C, the cam shaft gear meshing with B; E, a grounded segment insulated from the gear H; F, the commutating or contact brush; D, a key sliding in a straight spline in the cam shaft, but carrying a projecting end which passes through a spirally cut slot in the hub of the gear H. This gear is loose on the cam shaft C'. G is the generator gear which meshes with the spark controlling gear H. It is understood that the commutating brush F is stationary.

It will be readily understood that if gear B drives gear C, and if gear C is a fixture on its shaft C', then H, which is loose on C', depends for its drive on the pin of the key D. Further, if the key D be moved inward or outward, H will at the same time necessarily assume a different position in relation to C, and also in relation to A, the motor crank shaft. As gear H carries the insulated contact plate E and also drives (positively) the generator through the gear G, it is evident that changing the relation of the gear H to the crank shaft A simultaneously changes the position of the contact plate E and the generator armature carried by G, and the contact plate E and the generator armature are moved equivalent distances. If, therefore, the generator armature and the contact plate E are properly set when the crank A is in the dead centre, a movement of the key D will advance or retard the spark in a precise manner, and there will be no c of relationship between armature pc and motor crank shaft, except such c as is desired for advancement or re tion of the spark. The plate E shou so set with regard to the generator ture as to have a slight lead on the tion of spark discharge, so as to ample and perfect contact with the F.

There is yet another possible meth timing the spark produced by a rot ternator, and that is to have the cam gear carry an insulating porcelain bl its web and have a spark point, in with the plug and very near the web cam shaft gear, so near that the gap offers much less resistance to the than is offered by the plug. In su arrangement a continual shower of s would be produced, but they wou shunted through the auxiliary spark and cam shaft gear, except at such as the porcelain segment in the cam gear passed before the auxiliary point, when the added resistance deflect the spark through the plug cylinder. In this case, as in the othe generator would of necessity have gear driven.

Regarding the matter of employ condenser in shunt with the spark p believe it would be an exceedingly plan, as not only is the jumping pow the resultant spark increased, as p out by Mr. Clough, but also the heat of the spark is augmented thereby.

The method of using a single spar charge by passing an armature, u carried by the flywheel, before a st ary magnet, is employed on only o tomobile that the writer is familiar the Lanchester (an English car), and all accounts seems to work well; bu limited to one spark as generally a It seems a rather uncanny construct

-Valves—"Flat" Valves ersus Conical Valves.

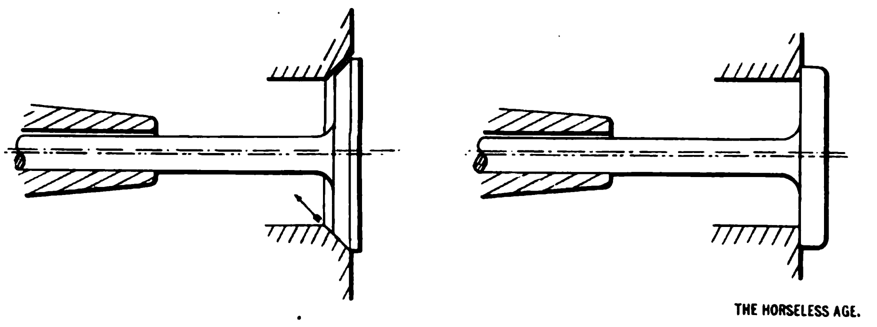
By Hugh D. Meier.

r the pioneer gas engine builders · discarded the slide valve gave isk poppet valves a trial before pted the conical valve is not › the writer. Today both types :ensive use in the United States, conical valve predominates in /here valves of the other pattern ɔd as unknown to the explosive ustry, owing perhaps to the faults .tal valves. In this country many , marine and vehicle motors, with ɔre horizontal valves, have been are today being built. If the :ylinder is a horizontal one the /ay to operate the exhaust valve ıns of a cam actuated rod that e valve stem. A pair of spur - 1 reduction) is all that is re- drive the cam. The admission be, and frequently is, operated .e way. Some manufacturers ar- admission valve in such a way wl and draw rod are required. t an equivalent device differently Γo the advocate of simplicity the ve of a horizontal motor, with its ical gears, cam shaft, cam, three rings, etc., may appear a compli- .rivance. Though not agreeing h this view the writer objects to helical gears for this purpose. :ar of the gear teeth will soon cams to open the valves later should, and so retard the spark, wide range of adjustment has led for. As most of these gears a very flat angle the wear must .e excessive. They are frequently ted properly, and, in fact, cannot : of the absence of a dustproof l for this reason alone are liable ›idly. The greatest objection to ırs, however, lies in the end ich is a factor that must be

One manufacturer, who makes the "direct drive" feature of his when on the high gear, makes mistake of employing no less ıirs of helical gears, one pair to ım shaft and the other to drive ing pump "off" the cam shaft at y high rate of speed.

is earlier machines this same loyed a horizontal engine and zontal exhaust valve. Though ıodels of this particular make ɔrizontal valves the flat valve en abandoned. The following ınd the accompanying sketches to prove that the conical valve ted to be placed horizontally; ıt valve is adapted to the work way it is supposed to work— fro or up and down.

the conical valve is shown just ›ut to close down to its seat. vs the valve with a flat disk ıinst its seat. The dash dotted lines in both cases indicate the centre line of the guide and that of the counter bore and cylindrical part of the chamber in which the valve stem is located, respectively. The dash double dotted lines indicate the centre lines of the valves. To prevent the carbon that accumulates on the stem of an exhaust valve from causing the stem finally to stick, it is necessary to make the valve stem of a considerably smaller diameter than the bore of its guide. The former should be fully one thirty-second of an inch smaller than the latter. Carbon does not collect on the valve stems of inlet valves, because the hot exhaust gases do not come in contact with them at all. The amount of play allowed need not be so much as in the case of exhaust valves, although there must be some. A horizontal valve rests against the lower part of the bore in the guide, and if it be a conical valve its disk will have to glide up the incline of the counter bore, as indicated by the arrow, every time the valve shuts down. In a short while such a valve will need to be ground on account of the wear, which is all in a spot in the counter bore and not very even on the valve. Perhaps it is too much to say that valves of this type break near the neck so frequently on account of their being seated violently on one side previous to coming to rest. That the flat poppet valve can be tilted only as much as the other variety, that is, as much as the play in the guide will permit, is evident. If the guide is long the amount of tilting is very small. Practically speaking the flat valve can only strike its seat squarely. It should not require grinding very frequently for one obvious reason, and, all things being equal, its stem, although of the same metal and dimensions, should be relatively stronger, and therefore have a longer lease of life.



Flat and Conical Valve.

When disposed vertically the conical valve will not compare so unfavorably with the flat valve. In fact, it is better, in so far as it offers less resistance to the flow of the gases. The more or less sharp edges of the flat valve and the edges of the annular chamber "wire draw" the gases, especially at those periods of valve lift when the valve is only partially open. To get the same efficiency the flat valve must be slightly larger than the conical one.

Neither type of valve will permit of poor machine work. Poppet valves must be true and the valve seats must be reamed carefully. A single reamer that will ream the valve seat and the guide or its socket at the same time should prove a valuable tool.

LESSONS OF THE ∴ ROAD ∴

An October Automobile Trip.

By L——.

With a gasoline carriage equipped with an auxiliary tank containing 5 gallons of lubricating oil and 6 of gasoline, a luggage carrier that accommodated only a limited wardrobe and an atlas, on September 29 at 2 o'clock we turned our backs upon "the dearest spot on earth," for an automobile tour. The day was beautiful, and the road in the condition one would expect after eleven continuous days of rain. We sped blithely along, care free, prepared to enjoy everything to its fullest extent. The beautiful scenery of the Connecticut hills, among which we have spent our lives, never grows old to us, and seemed especially attractive in the glowing colors of autumn.

A HORSE ESCAPADE.

About 4 miles from home a horse which had been quietly feeding in a pasture by the roadside gave a sudden snort as we came speeding along, and, clearing the stone wall which should have confined him, sprang into the road about 20 rods ahead of us, and with head and tail in air, galloped wildly along. If we increased our speed, hoping to outstrip him, he increased his also; did we stop, he stood and waited for us, only to continue the race as we approached. Two miles did that exasperating steed "lead us the chase," and at last, with what dignity he could command, the driver descended to the roadside and cutting a strong stick for the furtherance of his purpose, with diplomatic skill succeeded in getting beyond the animal and carefully drove him toward the carriage. He was succeeding beautifully when, reach-

ing a point within 10 feet of the machine, the horse stopped and showed a decided inclination to reverse. A timely prod from the stick and the prompt assistance of a nearby resident changed his intention, however, and he pranced by homeward bound. This is not our first experience of the kind, but time does not dispel the aggravation of the occurrence.

We called on friends in Torrington, then drove on through Winsted and beautiful Norfolk, again calling on friends here; then on to Canaan, where we stayed the first night. We had made 44 miles, running about four hours, and were well satisfied with the first day's progress.

At 8:30 the next morning, as we started, the driver remarked to the passenger: "I have explicit instructions for reaching Sheffield: Turn the corner, go between those two buildings, turn to the right and go as straight as God will let you." We wondered whether the informer believed in the guiding of a Divine Providence, or that an automobile was the invention of the Evil One. We stopped to photograph the picturesque little bridge in Sheffield, in the distance Mount Regia, with its tower, Mount Everett, and cloud capped Mount Washington. At times we stopped to enjoy and admire the scenery. This trip was to be one of enjoyment, and not a record maker. We reached Great Barrington at 10 a. m. Here we spent several hours in sightseeing. Driving on we photographed Monument Mountain, and in Stockbridge the Red Lion Inn and the Chenier Tower. Between Lenox and Pittsfield we took a picture of the scene of the late disaster to President Roosevelt. The roads were excellent to this point, but from here until we reached Pittsfield the mud was very deep and the roads uneven. The driver of a Standard Oil wagon, whom we met near Pittsfield, kindly accommodated us with 10 gallons of gasoline. We lunched in Pittsfield, then drove on through Hancock Shakers. And here I beg even the scorcher to stop and enjoy the view, which extends in every direction and is incomparable.

A TWO MILE COAST.

A light rain began to fall, but reflecting that we must expect storms as well as sunshine, and thankful for the good, hard roads, we came to Lebanon Mountain. The coast of 2 miles on State highway, with all power of the machine turned off, was one of the pleasures of a lifetime—no bars or "thank ye-ma'ams," and a uniform 6 per cent. grade all the way. As the rain increased and the roads beyond were described as "dreadful," we were compelled to spend the night in a little hotel in West Lebanon. We had made about 55½ miles the second day. We awoke at 6 o'clock the next morning to find the rain still falling. We waited until 8 o'clock, hoping the rain would cease. It did not, and we drove on through the most slippery mud we had ever seen. The rear wheels of the car would spin around and around, and it was only after repeated trials that we climbed a 22 per cent. grade in 4 inches of mud. At the end of one hour, we had traveled 9 miles, wondering every minute whether the next would find us in the gutter, over the embankment or still in the road. Had there not been brief stretches of slate road, the 9 miles would have required as many hours to cover.

RAIN! RAIN! RAIN!

We found no good roads until we reached Albany; the rain poured in torrents, and we were drenched to the bone in spite of rubber blankets. Thankful, indeed, were we to find warmth and shelter. A leak was discovered in the auxiliary tank, a trifle, which required eight hours of labor to restore. Whatever may be the sentiment in the mature minds of Albany regarding automobiles, the small boy voices his in deafening shouts of "Git a horse! Git a horse!"

We left Albany at noon the following day. If the roads we encountered the day before were bad, those of today were worse and worst. We drove through the slippery mud to Troy, through mud to Lansingburg, crossed the bridge at Waterford into more mud. There we were directed to a canal path, and on reaching its firm, hard bed our spirits rose. After driving perhaps a quarter of a mile, we were stopped by the guardian of the path, and quoth he: "Return to the road." "But," argued the driver, "the mud is deep, the wheels do slip, and I cannot pursue my journey there." His pleading moved not the grim custodian of the canal. Said he,

"MULES LIKE NOT AUTOMOBILES;

you must return." The failure of the passenger to photograph the scene has been one of keenest regret. The stoical face of the faithful guard, the angry, imploring face of the owner of the car, gazing first upon the hard, dry path of the canal, and then upon the deep, deep mud of the highway. Should we go back over the dreadful roads we had just safely passed or should we fly to ills we knew not of? Deciding that what was ahead of us could not be worse than that which lay behind, with grim determination we took to the mud. Alas! it was the time when having put his hand to the "plow," the driver should have turned back. With the steps of the carriage dragging in the blue clay mud every inch of the way, the owner drove the machine 4 miles, while the passenger walked. We thought each moment would be the last of life for that carriage, but it passed through the ordeal safely. The road was in the process of rebuilding, and the roadbed had been removed for the purpose. Two weeks of rain had not improved its condition, nor had the journey improved our temper.

Our quarters that night left somethi be desired. A leak was discovered i water tank, which was mended afte hours of labor. We left Mechanicsvi noon, and the question even now whether we should turn back or pus From information given by the by ers we felt confident that nothing we encounter farther on could be worse our experience of yesterday, so we on through mud to Saratoga. Severa required repeated efforts to climb, a longed for home. We tried to appr the beauties of Saratoga Lake, but was an ominous creaking beneath us covered with mud we were only to to reach an hotel in Saratoga at 6 o'

A BROKEN CONNECTION.

One of the connections of the oiler crank pin was discovered broken, accounted for the creaking of the da fore. A new piece was procured fr plumber, and the weary owner w several hours to replace it.

The following two days were sp sightseeing, visiting old friends i town and photographing places of in Saturday afternoon at 5 p. m. we s for Caldwell. Discovering when 4 out that we were on the wrong roa as it was very hard to drive over such roads in the darkness, we returne made a fresh start at 3 p. m. Sunday. rain was falling, but the roads in th rection were fair, the last 11 miles distance being covered by a plank planked at either end by a tollgate. the benefit of travelers who follow state that if you make your own c the charge is 12 cents, if made b keeper 13 cents, the nominal charge 12½ cents. We paid toll on our t prices ranging from 7 cents to 25 ce

A NARROW ESCAPE.

About 3 miles from Caldwell, in t out for a horse which seemed a frightened, the roadside bank brok pushing us into a fence. On looking closely in the darkness the driver d ered to his horror that the carriag overhanging a precipice, 50 feet or in depth, one front wheel resting on ing and the rear wheel on the sam half over the abyss. We descended the vehicle with every precaution, a thankful for a miraculous escape. cottage nearby we found two women men and a boy, whose efforts co with our own brought the carria terra firma once more. We were g reach the homelike Hotel Worden.

Monday dawned bright and clear had our first view of Lake George—piness never to be forgotten. We the morning strolling through Fort grounds and visiting and photogr Fort George and the lake. After bidding good bye to the genial pro

ife, we left the Worden. The ners had been taken from the by excellent management and eezing the carriage was put : little boat Mohican. We en- tly the sail of 39 miles to Bald- drove 3 miles over good roads eroga. The next morning we 'ort Ticonderoga. At the little : the entrance to the grounds we selves at a standstill. Investiga- the

OF THE DYNAMO BROKEN.

depth of the luggage carrier a d a spool of sewing silk were and the belt laced together. This was repeated at most inconve- ons, until a new belt could be

STOPPED BY A SHERIFF.

it several hours at the fort. In ion crossing the ferry from Ad- ction to Larabee, avoiding the we pushed west into the interior te to Shoreham. Here we were r a sheriff, who told us that the of the little village through had just passed had telephoned ain us until his wife and mother, out driving, had passed. The med to regard the matter as a de his regular duties, and per- to drive on, cautioning us to use aution should we meet the ladies. r of the Green Mountains at this magnificent, and we were not iger. We met the ladies 5 miles ; they saw the automobile, their not. We reached the beautiful f Middlebury at 6 o'clock, where an excellent hotel. Leaving the ext morning, we met a veritable Vinkle. As we waited while the anks were filled, he examined ge with much curiosity. "Wall! d he, "you can't go to heaven steam nor electricity won't take Can't go this way—can't do it."

GEARS WEAR OUT.

was clear, but very cold; the cturesque. At 5 p. m. the hotel ton was reached. At Ticonder- unpleasant discovery was made of the gears of the carriage were so new ones were telegraphed et us at Burlington. They had l, and we spent two days in at- : meetings of the Vermont State ociety. The third day after our ar- e gears had not come, we went Montreal, spending two days : found the gears awaiting us on , and three days were spent in the old ones, and

STRETCHING A CANVAS

er the vehicle to prevent mud ting into the machinery.

ober 16 we left Burlington for via Winooski and Onion Riv- excellent. Stopping for lunch lier and to photograph the Cap- rove on through Barre, and through the misinformation of some kindly soul to Williamstown. Oh, how cold it was in a cold room in that little hotel! Our plan had been to go to the White Mountains, then to Maine, following the Atlantic coast and Long Island Sound to New Haven. We had the most explicit directions as to the route we should take to Groton, a very level road. But through some stupidity on our part we went over the highest mountain in the vicinity. The grade varied from 20 to 25 per cent; both passengers rode all the way. The inhabitants of the mountains had never seen an automobile before, although some of them had heard that there were such machines. Did we meet a team, the occupants would tumble unceremoniously into the road—any way to get out.

We had left Williamstown at 6:30 a. m. At 11 we found ourselves in Orange, not 10 miles away, the thermometer 20° above zero. Then and there we decided to turn toward home and the south by the most direct route. There was a creaking in the machine which became more and more insistent. We could not locate it and so drove into a sawmill which was hospitably thrown open for us. A wood fire was roaring in a huge stove. Here in this comfortable place the driver

TOOK THE ENGINE APART.

All seemed intact, and it was put together again—three hours' hard labor. On removing the cap on one of the oilers it was discovered that the heat, produced by the long mountain climb, had so melted the grease in the middle of the cups that lubrication was impossible. This was adjusted in thirty seconds. We took the shortest cut to the Connecticut River, reaching Bradford at 5 o'clock.

WARMING UP THE AUTO.

The next morning the auto failed to respond to repeated crankings. Deciding that it was frozen, a strong pair of horses was hired to draw it to the top of the steepest hill in the vicinity, and running it down by gravity it was apparently restored to its normal condition. The snow was falling as we started toward White River Junction. We had gone about a mile when the radiators were discovered to be icy cold. The writer made a speedy diagnosis—

"FROZEN."

A good Samaritan by the wayside offered the services of his wife, kitchen fire and tea kettle, and by their combined efforts the normal functions of said radiators were restored. We passed through White River Junction, crossed the river at Wilder, and recrossing a little farther down had a very pleasant run, except for the intense cold, to Windsor. We left Windsor at noon the following day. The thermometer had risen and the drive was warm and pleasant.

TROUBLE WITH SPARKERS.

Three miles out we discovered some trouble in the sparkers. Three hours of faithful seeking did not reveal the cause of the trouble. Timely help arrived in the shape of two men and an automobile, the former made one or two practical suggestions, the difficulty was adjusted and we went on to Claremont for the night. Leaving Claremont the next morning we enjoyed the drive to North Walpole.

OTHER HORSE INCIDENTS.

An accident occurred that day which was the most unpleasant occurrence of our trip. As we were climbing a steep grade we heard a rattle and clatter beside us. A horse, harnessed to a long farm wagon, was running parallel to us in the field beside us. As the animal came opposite us he cleared the high stone wall and ran directly toward us, the wagon turned upside down, and clearing himself the horse ran wildly down the hill, whinnying loudly. The wagon was found to be unbroken except for the shafts, and the harness was broken also. It seems that an old man had been gathering apples in an orchard about an eighth of a mile from the road, the horse heard the auto, but his owner did not. He said he had often met these carriages with his horse, and the animal had never been afraid. The incident shows the contrariness of equines.

A little farther on we saw a woman in the far distance frantically waving her hand. Bringing the car to a halt as soon as possible we saw her leave her horse and carriage and deliberately walk to the other side of the road. She was talking vigorously all the time, and part of the words which reached us were these: "You are a man—and you can lead this horse by—your are—a man—I shan't touch him—you're a man"—ad infinitum. It took the driver of the auto some time to grasp the situation, the onslaught was so sudden. At length he did so, and saying, with his most courteous manner, "Madame, I shall be happy to assist you," he led the horse past the carriage. And from the calm and quiet way in which the animal walked by we doubted if he really saw the automobile.

We photographed some of the charming views of the river, North Walpole and the quaint old tollgate between that place and Bellows Falls, then drove through Brattleboro and South Vernon to Northfield, where we spent the night. We visited the seminary and Mount Herman the following morning, and drove through Miller's Falls (it was an accident) to Greenfield, Deerfield, South Deerfield and Northampton to Holyoke. The days were cool, but we did not suffer from the cold after leaving Windsor.

The last day we came through Springfield, Warehouse Point and Windsor Locks to Hartford. We spent two hours in that city and came home through New Britain and Bristol. We had traveled 895 miles, were three weeks and three days on the trip, had consumed 103 gallons of gasoline and had the best good time of our lives.

The Fifth Machine Gives Satisfaction.

By "Steam Carriage."

In April of 1900, having during the previous autumn given my first steam carriage a month's trial, at the end of which I sold it to another enthusiast, I wrote you my criticism of its design and construction; and also described my ideal vehicle of the future, the builders of which I had then already interviewed. I was determined to have next time a long list of indispensable things, and with them and comprehending all, much greater strength and the very best workmanship.

In due season I received my new machine. It seemed to me to have everything I wanted. Certainly it had the stipulated strength, and along with it a corresponding increase of weight—for with tanks full and two persons aboard it weighed nearly a ton. Undeniably it had also first rate workmanship put into it. And yet, such an unreasonable person am I, it did not please me; and this will seem the more singular when I say that it was, I am sure, of the identical make over which your correspondent "G" enthuses, in his letter published in your issue of November 12. He tells why he likes his; and as an offset I will say why mine did not content me.

SOME OF ITS FAULTS.

Of course one strong reason was that I thought I could see, before the end of the year or more covered by the construction and my use of the carriage, indications that radical improvements in motor vehicles were soon to materialize; aside from this consideration, the principal faults I found were as follows: First of all, let me say that there were no ball or roller bearings except on the rear axle: and although the compound engine with its emergency device for putting high pressure steam into the large cylinder was adequate at all times, the steaming capacity was too limited for bad roads or long hills. A certain trip of 10 miles over not exceptionally muddy roads, after several months' use of the machine and after improvements in the burner, occupied three hours. The very best record I ever made was 7½ miles to 1 gallon of gasoline; and 1 mile to a gallon of water was all that could be counted on.

DIFFICULT OF ACCESS.

My second great objection was this: That although excellently built, the mechanism was very difficult of access. The designer seemed to have said to himself: "This can never get out of order, so no matter how we stow it away." But things did go wrong occasionally; and then there was trouble indeed. I have worked over (and under) carriages since, three of them, but never as I had to on that, and the miserable apprehension that something might happen on the road, away from tools, jacks, pumps and helpers, took away much of the pleasure of travel. When *anything was to be* done, at least three-quarters of the time was likely to be spent in getting at the place. For example, it took five minutes one day to replace a valve stem packing which blew out; but an hour and a half to take things to pieces which were in the way, and to restore them, the workman lying on his back under the carriage.

Again, the water gauge was under the seat, opposite the tiller, and reflected in a mirror. It required continual attention to keep it from being covered by a lap robe or a woman's skirts; and it was the first thing obscured by gathering darkness. Other minor objectionable features were air pressure in a 12 gallon gasoline tank; cylinder oiling by hand; noisy drive and steering gear; location of chimney so as needlessly to heat the occupants; unsatisfactory injector ("G" admires his, I see); frequent necessity of taking front wheels off to oil because of the clogging of the channels provided; inaccessibility of fusible plug, etc. Enough said; I knew I could do better.

OUT OF THE FRYING PAN INTO THE FIRE.

But in 1901 I did worse. In my exasperation over the difficulty of getting at the "insides" of my second carriage I bought the third (also a steamer), mainly because of the apparent simplicity of its design, combined with equally apparent strength and good workmanship. Everything else I took for granted on the statements of the designer. But too late I found that not only had he never ridden in any other make of carriage but had never even taken a long country trip in his own! The greatest fault of this machine was that, probably because of its weight and the fact that all bearings were plain, the amount of power it would require was underestimated, and it did not have boiler enough to keep it going at a decent pace on any but the smoothest roads. Aside from this fatal objection it had some good points; but I sold it, of course at a heavy discount.

TRIES A GASOLINE MACHINE.

"Hope springs eternal in the human breast." After three steam motor cars, I began to wonder if I had been wrong in refusing to give any attention to those propelled by gasoline engines. So early this year I went to Boston and put myself in the way of trying, as a passenger, all I could find; at the same time not neglecting to inspect any steamers which crossed my path. During the three summers past I had found plenty of interesting work on my various machines, but the numerous long, delightful journeys I had hoped to take seemed to be always a year in the future. I said to myself: "This season I'm going to ride; I will have two carriages; someone else shall do the tinkering; and one of the two ought always to be available." And thereupon I ordered a gasoline carriage for April delivery, and my fourth steamer for June.

To shorten my story, suffice it to say that I received my gasoline vehicle on time; got enough of it, and sold June arrived; and the thing I joyed in my entire experience w the loading it into a car for N To criticise it in detail might public and fruitless renewal of troversy with the builder. He is right; I know he is not; and good way to leave the subject.

THE NEW STEAMER.

June came, and with it my new This time it was one of the class the sarcastic "G" alludes as "sui to run in circles on the parl though, perhaps, he might not vere upon this particular make rate, it was a comparatively cheap machine, and it might hav ter work put into it, in some But it has served me well all su an aggregate of about 1,600 n ning, in trips of from 20 to 170 is not materially depreciated t see. It never has failed to st wanted to carry me to my desti to bring me home again, and I no delay on the road which wa marily my own fault. It has a steaming and engine power speed on any road or any hill I countered. It has no chain tro there is no chain; nor any of the merous water glass annoyances, is no glass, and the indicator s can be read in darkness as well light. The boiler cannot po burned while under way, because ble plug is always on duty, and blows out can be replaced in tw without the necessity of wallowi dirt, carrying special tools or ev the fingers. A large quantity o be carried, but only a little is ur sure at a time. Both pilot and are under control from the seat. tomatic and positive cylinder quires a minute's attention once 40 miles. Emergency hand p water and fuel are convenientl And most important of all, nea part of the mechanism and its pi sight and entirely accessible for i or repair.

Like "G's" boiler this "holds n a quart"—about 3½ gallons, to t level, and as it will run 10 to 12 gallon of fuel and 1½ per gallon there seems to be no reason fo at its limitations, compared with steam carriage extant. One mor am pleased with is the arrang nearly all working joints, so that easily be taken up, which seems best thing to preventing it.

I have no desire to "boom" th ular carriage, nor to claim that be improved upon; but I consid no way can the "state of the art" advanced than by the comments gent users upon the machines hands, applauding what they find

ell as detailing the obstacles to
operation.

ADVICE TO AMATEURS.

ıg cannot be too often impressed
ıteurs, i. e., that one secret of
n the road is proper cleaning, in-
and lubrication, given in the
:r or before every considerable
l if in addition every user will
ime and effort needed to become
ith his machine, theoretically and
, there will be fewer complaints
's. And once more, if the oper-
light motor carriage will be con-
reasonable and lawful speeds, and
pt to compete with road locomo-
ıree to ten times the weight and
ıd will use caution in rough or
ılaces as the competent driver of
vould do, he can, I believe, get
/ice and satisfaction out of any
eral "best" steam vehicles offered
quite agree with "G's" expres-
ıvor of steam power; safe boilers,
burners, rotary engines, con-
more trustworthy automatic de-
er design and construction are in
not already here; and is it too
ıope for perfect tires, also?

BEGINNERS PAGE.

The Steam Engine.

(Continued.)

REVERSING MECHANISM.

Double acting engines are generally reversed by means of the Stephenson link reversing gear, illustrations of which are shown in Figs. 1 and 2. In these drawings are shown the various parts of the valve and reversing gear and a section through the cylinder and valve chamber. The section through the cylinder is swung through an angle of 90 degrees to bring it into the same plane as the view of the valve mechanism, thus facilitating an explanation and understanding of the action of the reversing mechanism.

In the drawings, A represents the engine shaft, upon which are fastened the eccentrics B and C, the centres of the shaft and the eccentrics being indicated by crosses. It will be observed that the two eccentrics are arranged directly opposite each other. The eccentric rods D and E have bearings upon the two eccentrics respectively, and at their upper end they are pivoted to the opposite ends of the slotted link F respectively. In the slot of the link is located a link block G, to which is pivoted a fork H, into which the valve rod I is screwed. J represents a portion of the engine frame shown in the correct position with relation to the link and crank shaft. To this portion of the frame is pivoted the bell crank K, which connects by a link L to the slotted link F. The other arm of the bell crank K connects to a lever near the seat of the vehicle. By means of this lever, the bell crank and the link L, the slotted link F can be shifted upon the link block G, which operation causes the reversal of the rotation of the engine.

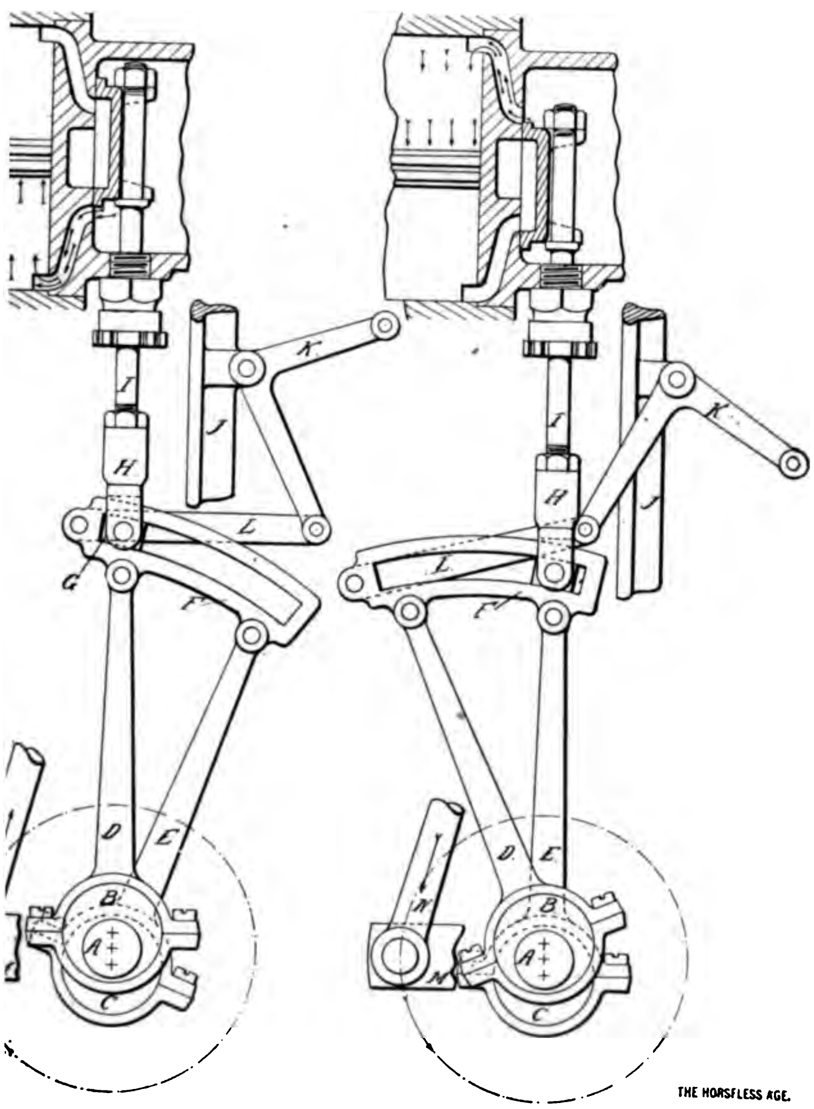
The link L is shown pivoted to the link F at the end of the latter. This is the usual practice in automobile engines. It is theoretically more correct to have this pivot joint at the middle of the link F. and some engines are constructed that way.

M represents the engine crank and N the connecting rod.

It will be readily seen that, owing to the opposite location of the two eccentrics, the opposite ends of the slotted link F move in opposite directions at any given moment; that is, while one end of the link approaches the crank shaft the other end recedes from it. If the link is moved so the link block is located in one end of the slot the motion of that end of the link alone determines the valve motion.

In Fig. 1 the link is shown in position for forward motion. The piston is at about half stroke upward, the crank being shown in a horizontal position. Now the eccentric B determines the valve motion. The centre of this eccentric is directly above the crank centre and the valve is therefore at the limit of its upward travel. The steam port to the lower end of the cylinder is full open and live steam enters this end of the cylinder and forces the piston upward, which results, in turn, in an upward motion of the connecting rod and a right hand rotation of the crank, all as indicated by arrows. From the upper end of the cylinder the expanded steam is exhausting.

In Fig. 2 the crank, connecting rod and piston are shown in exactly the same position as in Fig. 1; but the slotted link F has been shifted upon the link block G to its other extreme position. Now the other eccentric rod E is in line with the valve rod, and the eccentric C therefore determines the position and motion of the valves. As the centre of this eccentric is directly below the crank shaft centre the valve is at the limit of its downward travel. Consequently the shifting of the slotted link F has resulted in the shifting of the valve from one extreme position to the other, or through just one-half its periodical motion. The result of this valve motion is that now the upper steam port is open to the steam chest and the lower to



FIGS. 1 AND 2.—REVERSING GEAR.

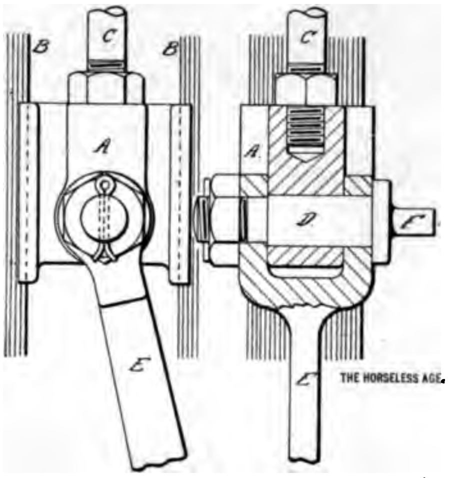


FIG. 3.—CROSSHEAD.

the exhaust port. Steam therefore enters the upper end of the cylinder and forces the piston down, causing the crank to turn left handedly, or in the opposite direction as in Fig. 1, as indicated by arrows. It is to be mentioned that the two eccentrics and the two eccentric rods are exactly alike; and if the eccentrics were set at right angles with the crank, as shown, the engine would operate under exactly the same conditions backward as forward.

Since the two ends of the link move simultaneously in opposite directions with regard to the centre of the crank shaft, the middle part of the link does not move at all. Consequently, if the link is so shifted that the link block is in the centre of the link the valve would not move at all if the engine was turned over, but would remain in the mid-position of its travel, in which, as already shown, both ports are closed. "Putting the link in the centre" therefore shuts the engine down. In other positions of the link, between the mid-position and the extreme positions, the valve travel is reduced, which results in an earlier cut off of the steam admission and consequent greater expansion and greater economy. The speed of the engine would, of course, be reduced by reducing the steam admission, and "linking up the engine" or working with variable expansion would constitute an economical method of speed control, but is not much used.

THE CROSSHEAD.

Fig. 3 represents a common form of crosshead construction. A represents the crosshead and B B the crosshead guides, which are planed iron strips of rectangular section bolted to the engine frame, perfectly parallel with each other and with the cylinder bore. The crosshead is formed with shoes at its opposite sides, which are planed with groves into which the guides fit. The crosshead is drilled and tapped centrally from the top to receive the piston rod C, which is secured in position by means of a check nut. It is also drilled with a hole for the crosshead pin D. It will be seen that the connection rod E is forked at the end, the fork spanning the crosshead and making a pivot joint with the latter by means of the crosshead pin. The latter is essentially a shoulder screw, which is clamped firmly in one branch of the fork by means of a nut, and which turns freely in the crosshead. The nut is secured by means of a split pin. The crosshead pin is provided with a projecting pin F for operating the so called crosshead feed pump.

THE CRANK SHAFT.

Some crank shafts for automobile steam engines are turned out of a solid bar or block of steel, with the cranks, eccentrics, sprocket, etc., all in one piece. In others these parts are keyed upon a straight shaft. Fig. 4 represents a crank shaft of the latter type, with ball bearings. In thi A A are the crank pins, with the c the ball bearings upon them; B B crank arms; C C the main cran bearings; E E and F F the two eccentrics, and D the sprocket pini sprocket may be screwed on the sl a right hand thread, abutting a shoulder, and secured by means with left hand thread.

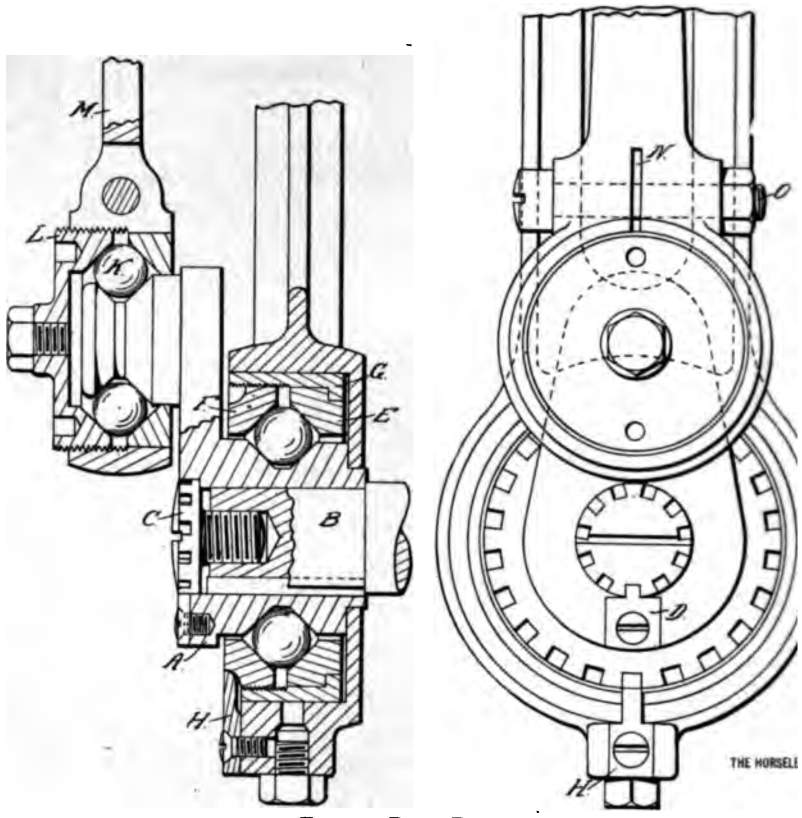


FIG. 5.—BALL BEARINGS.

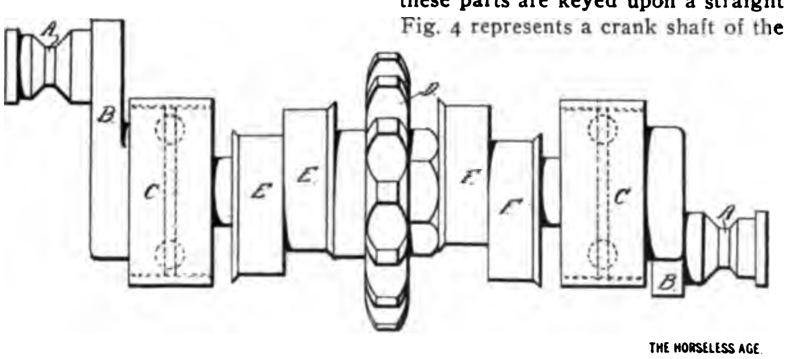


FIG. 4.—CRANK SHAFT.

THE BALL BEARINGS.

Fig. 5 illustrates a form of ball used on engine cranks. The cra keyed onto the end of the shaft I forced up against a shoulder on by means of a fillister head screw head of this screw is made with a erable number of notches in its p into any one of which may engag ing finger on a locking plate D se the crank.

The hub of the crank is turne groove in its periphery for the bal in. The balls are held in place by cups E and F. The former is forced into a retaining ring G other is screwed into the ring, balls have been put in place, until sired adjustment is secured. The also provided with notches in i edge, and is secured against accid screwing by means of a locking with locking finger, secured to th frame I.

The crank pin bearing is very The two cups K and L are scre the threaded opening at the en conecting rod M. The rod is sa at N and is clamped at that part b of a bolt O, which prevents the ing of the cups.

.COMMUNICATIONS..

:hicago to Cleveland.

Iorseless Age:

g seen so many different experi-
counted in your paper I thought
account of a trip from Chicago to
d in November might be interest-
ome readers. My companion, A.
dward, and I have used the same
automobile for a little more than
ı which time the machine used on
has been run about 9,000 miles.
:iage is a "flash boiler" steamer,
: with extra attachments 1,500
In front, where a condenser is
:s placed, I have a box for lug-
th capacity of about 4 cubic feet,
find a great convenience.

ɀ heard much about the sand
Northern Indiana we acted on the
ɔn to keep away and planned a
ore southerly, running through
Hobart, Valparaiso, Plymouth,
Colorado City, Fort Wayne, Van
:lphos, Beaver Dam, Findlay, Tif-
view and Elyria. To Hobart the
mostly good macadam. Between
ɪo and Plymouth, and through the
e marsh, the road is rather heavy.
Fort Wayne on a rainy afternoon
lusk ran over a pile of gravel
on the road, narrow enough for
.s to pass each side, but, alas! high
or the chain to act as a conveyor
y a quantity of gravel onto the
. The result was a sudden stop.
tion showed the engine frame to
nough to interfere with the eccen-
ı hour's effort under the machine
ırge wrench loaned by a farmer
ıachine in apparently good condi-
n.

upper the sky cleared, the moon
:autifully, and we ran on until,
miles east of Fort Wayne, what
:d the "mud road" was reached.
l was quite plastic and the bottom
ı that it was not safe to run at a
ich would carry one through the
momentum and power.

the wheels sank to the lowest
rith mud nearly a foot deep
, he became a real chauffeur.
driving wheels wound with rope
hrough about 6 miles of this in
ɔ hours, and later arrived in Van
th only a reach broken at the
This my partner neatly repaired
:ce of ¼x1 inch iron, a bolt and a
ıge clips obtained at a blacksmith
)ur front axle also had been
y running into a ditch to give a
l team the whole road. As this
:he steering it was drawn into
h a turnbuckle. After a couple
spent on these repairs we started
ird day's run and were rewarded with stretches of pike so good that the machine could be run at its limit, and our odometer ond the footboard showed a speed as high as 30 miles per hour. This odometer has large figures, and, being in plain sight and reading to the hundredths of a mile, the speed is quickly calculated. Dividing the time in seconds for one hundredth of a mile into thirty-six gives the speed in miles per hour. For illustration, one and one-half seconds per one hundredth of a mile—thirty-six divided by one and one-half equals 24 miles per hour. For accuracy time is taken on one-tenth mile.

In the gas and oil district the roads were badly cut up. Here we met many vehicles. Few of the farmers and not nearly as many horses were at all frightened. As we always ran slow near a horse many amusing remarks were heard. In the swamp district one man in a tone of good fellowship and appreciation greeted us with "That is a —— of a machine you have."

Our machine ran so smoothly and responded so readily that we were tempted and did run beyond the limit of safety, and as the result broke two front springs, a few wire spokes and one ball in a wheel bearing. For the first an extra spring leaf carried was just the thing. The other was broken in dropping into a rut near Elyria on Sunday morning, for which a block of wood was substituted. The run was finished with the engine and generator in as good working order as at the start. The condition of the roads may be judged by the quantities of oil and water used. The same machine has been run on Sheridan road 35 miles on 20 gallons of water, with gasoline consumption at the rate of 1 gallon for 13½ miles.

Gasoline consumption, gallons..	57
Water consumption, gallons....	360
Miles run......................	383

The trip took us three and one-half days across the country, mostly pretty and interesting, with glorious weather modified by a few hours' rain, which made the experiences of the trip more varied and tried the work of the automobile manufacturer.

WILL. H. BROWN.

Locking Gear for Side Steering—Gear Ratios.

Editor HORSELESS AGE:

Are there any locking devices in the market that will lock the steering wheels where a side steering lever is used?

Will it be necessary to change the sprockets on the carriage if the wheels are changed from 30 inches to 34 or 36 inches diameter?

A. D. E.

[A locking device of this kind is made by the General Electric Company (automobile department), Lynn, Mass. If you substitute 34 inch or 36 inch wheels for 30 inch wheels without changing sprockets the vehicle will run faster on the level, but will not be able to climb as steep grades, and the low gear has to be resorted to sooner. It is not just necessary to change the sprockets, but most likely it would be best to change them so the "gear" would be again the same as before the wheels were changed, as it is to be presumed that the manufacturer geared the machine in the first place in the most advantageous ratio.—ED.]

That Chain Repair.

Editor HORSELESS AGE:

I find I owe an apology to Robin Damon. It seemed to me so self evident that all auto chains should be fitted with a detachable coupling link that it did not occur to me that any manufacturer would market one which could not be taken off its sprockets without practically destroying a link, and could not be replaced without riveting in a cramped and most disadvantageous position, rendering it extremely likely that the job, if done on the road, would be insecurely accomplished. I therefore jumped to the conclusion that Mr. D. had at some time broken his coupling link, and neglecting to secure a new one, contented himself with using the regular links. I thought he preferred to give himself this extra trouble rather than bother to secure a supply of coupling links, and intended to point out that he ought not to complain then of the work he put on himself. I did not imagine that he does not "have some knowledge of an automobile," for, of course, if there had been a coupling link in his chain in the first place he would have been aware of it, and have known that he could get more if he needed them. I see now that my "criticism" was liable to convey the impression that I thought him in ignorance of the easiest method of chain repair, and for this unintentional discourtesy I most sincerly ask his pardon. I ought to have informed myself of what I now learn to be the fact—viz., that the transmission of the car used by Mr. D. has the front sprocket in such a contracted space between the flange of a clutch and the gear case, that there is no room for any projection on the chain larger than the rivet heads to pass.

And yet, aside from the injury to Mr. D., which I regret, I do not know but that some good may come from the incident. As I understand, your object in printing such communications as mine, is for the benefit of the auto public, either by warning purchasers against buying rigs with unsatisfactory features, or by calling to such features the attention of builders so as to have them improved. Now, had I looked up this point before writing, as I repeat I ought to have done, I should in all probability never have written, and the chance of good resulting would have been lost. Still further: Mr. D. says "gasoline carriages are not fitted with a bicycle chain that can be put together with the fingers of one hand." If they were so fitted, and same "bicycle chain" were adequate for the work on them, would it not be a great merit? Of course, his imputation is ob-

vious, and meant to disparage the steam car, but instead it seems to me a strong indorsement of my point in former letter, that one superiority of steam over hydrocarbon engines for auto use lay in the absence of abuse of the chain, and absence of trouble with chain, owing to absence of a flywheel.

Finally, for the benefit of beginners, who have not the "years" of Mr. D. nor the "months" of myself, to teach them "knowledge of things" (Mr. D. says: "I have had automobiles three years—I have owned and run steamers during the seasons of 1900, 1901, and 1902), let me mention that the heavy chain necessary with the gasoline motor need not be sans coupling link unless crowded too closely by other parts of the rig to give room for such coupling. I have today examined two heavy French cars, each approximating double the "ton" weight of Mr. D.'s, and find their side chains all joined by coupling links closely resembling those in use on bicycle chains, having in place of one of the rivets a bolt screwed into one of the side plates, fitted with a lock nut, and that secured by a cotter pin. R. W. B.

A Steam Logging Outfit.

WATERVILLE, Me., November 21.

Editor HORSELESS AGE:

We have just completed one of our steam log haulers, run it out of the shop and taken a picture of it, which you will find enclosed. You will notice that the machine now has wheels under the forward part; we use wheels in the summer and a sled in the winter; the rest of the machine remains the same both summer and winter. You will notice in looking at the photo that we have an endless lag bed which makes the rear runner carry practically the whole weight of the machine of about 15 tons, with the exception of about 1 ton that bears on the forward sled. The runner is driven by a pair of engines and takes its steam at five-eighths stroke, so it can never get on dead centre. The runner, or endless lag bed, which you can see in the picture, is made of steel castings jointed together in such a way as to run over the sprocket wheels with toe cocks cast on them, the same as on a horse, so when they come in contact with the snow or ground there can be no slipping, even if it strikes the glare ice. This runner is driven through its rear sprocket wheel, which is constructed in such a way that the runner can tilt at any position that the road may require. The entire weight of the machine sets on a 5 inch axle running through the runner and hung loose at the ends so that the runner always tilts easily over rough going, rocks or anything that it may come in contact with, with a remarkable easy and quiet motion, which it is impossible to get from a round wheel. The opposite side of the machine is a duplicate of the side you see in the picture.

The machine is driven by a 100 horse power equipment. The boiler is a regular locomotive boiler fitted up with the necessary injectors, water tank and suction hose for taking water from springs or streams along the road; also with a cabin and wood box in the rear, as we always use wood, for the reason that using wood is far cheaper in the lumber woods than to use coal. The machine is reversible, the same as a locomotive, and will run one way as well as the other. It has a force draught, caused by the exhaust, the same as a locomotive; it also has a governor on the steam pipe just before it branches to each engine, which governor controls the speed of the machine and is belted to the main shaft. This governor is set to give the machine a speed of 5 miles per hour, and presents the advantage that the engineer may pull the throttle wide open and the machine will take care of its own speed in plunging in and out of sharp pitches and cradle knolls, and gets the necessary steam for up hill. This machine, without any load hitched to it, is capable of climbing any grade that a man can climb up afoot. Our experimental machine, which we had in the woods last winter, could easily carry 20,000 feet spruce lumber per load over a logging road of 7 miles and make two turns per day. The reason why we put on two sets of double engines, making four cylinders in all, is to get rid of the compensating gear; in making turns in the road one pair of engines runs a little faster, which makes it the best possible compensating arrangement. To steer this machine we put one horse in the shafts of the sled that belongs under the front end, tie up the reins and let him go. We never ask him to start or stop.

The Lawrence, Newhall & Page Company, of Shawmut, Me., have bought the experimental machine that we had in the woods for them last winter; also the two new machines now under construction, which are practically all done, and of which enclosed is a photo. They intend to move on a road of 7 miles their entire output of lumber, making 7,000,000 feet. Ac to our experiment last winter we c as much lumber for about $8 or pense as they can for $100 expen horses, to say nothing about the la preciation in horses compared w machine. We hitched up four lumber sleds, one behind the oth put 5,000 feet on each sled. Th sled has a coupling on the end pole, the machine is backed up an dropped, the same as on steam ra

This machine is especially useful to break out its own roads or snow plows after big storms, etc. ent was granted on it May 21, 190

A. O. LOM

An Australian Kerosene M

MELBOURNE, Victoria, Octob

Editor HORSELESS AGE:

You will be interested to know th using with great success heavy k .825 specific gravity, in an intern bustion engine on my car. This is $4\frac{1}{2}$ inch diameter and 6 inch str develops 6 horse power on the b 800 revolutions. The total weigh car, with four passengers, is over yet we get 20 miles out of half a g kerosene.

Jump spark ignition is used. no heavy deposit in the valves, no of either carbon or tar in the cylin the engine starts on cold kerosene. is no heating of vaporizer and the has all the flexibility of a gasoline with the advantage of safety, low running and readily obtained fuel. is attained by very perfect combus smoke, and no bad smell. I believ completely solved the heavy oil for motor cars. I have been wor it eight years, and tested on roads dreds of miles, and can guaran kerosene to do all that gasoline w

HENRY S

STEAM LOGGING OUTFIT OF A. O. LOMBARD.

·ll Motor Cars of 1902.

(Continued.)

THE FUEL.

onsideration of the fuel used is a ›ortant portion of the subject. A :at deal has yet to be learned. It › the author astonishing that gas- ›uld have been so long in use and .ttle known about it. He believes rrect in stating that in his country neither the maximum explosion s of various gasoline mixtures, times of attaining maximum pres- ›r the rates of cooling, are yet ›ed. Under these circumstances as far as carburation is concerned, working more or less in the dark. 'ears ago Dr. Boverton Redwood ted some valuable information on ect.

results, adequate for Dr. Red- purpose, are not sufficiently com- ve for the requirements of the manufacturer. For his purpose, ›n of the value of any explosive involves knowledge not only of :imum explosion pressure as one ut also of the rates of cooling as factor. It is only from the fac- producing pressure and the capa- esisting cooling, that we arrive at n pressure which determines the ciency of the mixture. The de- ion of these factors is still want- is, however, likely that the defi- will soon be supplied, for the :s in a position to state that the y experiments are in progress. ılts will be awaited with consider- :rest, and there is little doubt that l establish the value of gasoline ıg devices for carburetors when r and economy are rigorously fol-

ıere is another phase of this prob- uiring even closer research. Be- e determination of the fact that gasoline mixtures have certain cooling, there is the ascertaining trinsic reason, the relation of ef- ause, that is, the true knowledge ce of the problem. Attention is to this incomplete knowledge of es of cooling, because it will be to again in connection with an in- problem.

the head of fuel it may be noticed automobiles of today, more es- those of French makers, show a to acquire greater range, that is, ially suited for the consumption gasoline or alcohol. Is this a of the supersession of the re- duct of nature by the purely arti- duction?

hould the presence of water in the motor give this increased efficiency? ttempting a reply, it may be stated same phenomenon has been ob- n the gasoline motor; for, if the published reports are to be credited, the addition of water to the charge in the Banki engine reduced the consumption to 0.45 pint per brake horse power per hour. There again, in general terms, the advantages claimed were greater economy, greater elasticity and smoother running.

In July of this year C. Rainey, at the author's request, made some experiments with water injection in a gasoline motor. Owing to want of appliances no very close work could be done, but the general results reported by Mr. Rainey are these: 1. That while maintaining the gasoline supply constant, the addition of water gave increase of power and cooler running. 2. That this effect was maintained until the water reached a quantity equal to the amount of gasoline. 3. That a larger quantity of water interfered with the sparking, and caused frequent failures of ignition, which after a short time failed altogether. As far as the author is aware, no very complete explanation of these better results has so far been published. The advantages of water have been described as a contribution of mechanical energy in the form of steam, as a cooling agent obtaining increased charge volume and higher compression, as an absorber of the violence of explosion, etc. To these explanations the author will add another. During the recent testing with tube ignition of a gasoline motor, in which the cylinder wall developed porosity, admitting moisture to the combustion chamber, a sudden advance in ignition was observed, together with an increase of exhaust temperature, leading to burning of the valves. The author considered the following to be the possible reason: Assuming the cylinder charge to be pentane, C_5H_{12}, the addition of water or aqueous vapor in contact with the incandescent tube might lead to partial decomposition, carbon combining to carbon monoxide, hydrogen being liberated. In other words, water gas would be formed. The advance in ignition would be due to the greater inflammability of the gas. Unfortunately the testing department in question is entirely destitute of any laboratory or appliances for following up questions of research, and the author was unable to analyze the exhaust gases, and thus determine whether the hypothesis of more complete combustion was correct.

Treated mathematically, as a purely thermal problem of profit and loss, it can, no doubt, be shown that, whatever be the physical condition of the water at the beginning of the compression stroke, and whatever be the laws of specific heat, the addition of water to the charge is an entry on the wrong side of the balance sheet of an explosion motor; and that the advantage of water injection can lie only in the possibility it gives—of employing much higher compression without risk of premature ignition—of obtaining heavier charges—and of reducing heat loss through the cylinder walls. But does this academical statement meet the whole case?

Several arguments might be advanced for the entry of an additional factor into the problem, the possible improvements of combustion by the presence of water vapor. The idea is not new. The author's suggestion is that the presence of water vapor, at a certain temperature, may disturb the chemical equilibrium of the oil at the critical point, hastening and promoting its decomposition. That a hydrocarbon, even without the presence of water, would, in the combustion chamber, decompose into light and heavy constituents, seems very probable—the result being combustion and heat evolution more or less of an irregularly progressive nature. An interesting diagram, Fig. 1, illustrating such action in a coal gas mixture is given in Mr. Grover's treatise on "Modern Gas and Oil Engines." The

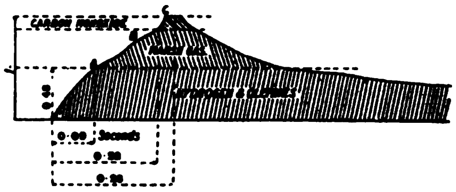


FIG. 1.

diagram represents the explosion of 1 vol. coal gas with 12 vols. air. Out of the 20,162 thermal units in 1 pound of coal gas Mr. Grover calculates that 0.417 of the total is due to the hydrogen and olefines. Assuming, therefore, that decomposition of the mixture takes place, and that the resulting hydrogen and olefines are first ignited, leaving the marsh gas and carbon monoxide to inflame later, the pressure curve ought to show its first alteration at 0.417 of its maximum height. It will be seen that this is practically the case, thus proving decomposition and progressive burning in the case of the coal gas mixture.

With data of their 7 brake horse power oil engine, Messrs. Tangyes supplied the following diagram, Fig. 2. This diagram shows very distinctly sudden and high explosion of volatile gases, succeeded by gradual combustion of slower burning products. There is, therefore, evidence for the decomposition of hydrocarbon charges by cylinder temperature, and further for the promotion and perhaps modification of that decomposition, by the presence of a small percentage of water vapor. The addition of a considerable proportion of water naturally and obviously conduces to cooler running, but it is not clear whether these larger proportions aid, impede or prevent the decomposition of the hydrocarbon. They do, however, increase power. The most recent converts to water injection appear to be Priest Brothers.

There are, however, strange things in nature, and it is quite possible that a very

FIG. 2.

different explanation may be the right one.

It is claimed that the addition of either hot or cold air to steam serves to lower the point of condensation. Now, it is possible that some analogous action takes place when water vapor is mixed with the explosion gases. Is there a development of latent heat? Is there a marked retardation in the rate of cooling, and therefore a higher exhaust temperature? Is there a retarding effect on dissociation and so the attainment of a higher initial temperature; or is there an acceleration in recombination after dissociation, and so the maintenance of a higher mean temperature? Who knows? But as Mr. Clerk puts it, without exception the actual pressure of explosion falls far short of the calculated pressure; in some manner the heat is suppressed or lost; for some reason nearly one-half of the heat present, as inflammable gas, in any explosive mixture, true or dilute, is kept back and prevented from causing the increase of pressure to be expected from it. There is, therefore, a very wide margin for greater initial heat development, and it may be that the presence of water vapor, true or decomposed, has some developing action on this latent potentiality. The whole question is obscure, and automobilists must not conceive the idea that even if water is proved to be a useful addition to the charge, the problem is at once solved. Probably correct employment of water will demand certain conditions that have yet to be studied, and may require a change in the motor design. Anticipating the objection likely to be raised, that water will corrode the valves and cylinder, the author replies that this does not appear to be the case.

In another direction also, and this time with more definite knowledge and purpose, improvements in fuel are under consideration. These lie in chemical additions of explosive nature as gasoline enrichers. The idea is not new, and frequently recurs in past patents There is no theoretical difficulty in chemically increasing the explosive power of gasoline. But there are difficulties of a practical character which consist in finding an enricher that fulfills the two conditions—of not increasing the cost of the fuel per horse power, and of not introducing any element of danger in its use.

Picric acid has been experimented with, but it is manifestly dangerous to handle, and is said to leave a highly explosive deposit in the exhaust pipe and muffler. Bisulphide of carbon has been frequently suggested; but it will certainly need to be deodorized. Curiously enough salt also has been recommended. There are, however, other possible means of enriching gasoline, and the author, in conjunction with H. J. Bult, is now considering one of a promising nature.

Among the fads relating to fuel improvements may be mentioned various proposals for increasing oxygen in the air charge.

IGNITION.

Next to the formation and constitution of the charge come the methods of its ignition. Lamp ignition, except as a standby, may be said to have disappeared.

A little while ago some interest was excited by a new catalytic ignition. Such a method, however, has neither the flexibility, the inflammation capacity, the certainty, nor the suitability of properly designed electric firing. When it is recalled that incandescence is dependent on the concurrence of several factors into which the charge composition and governing of the motor enter, and that retardation and advancement of ignition are not nearly so perfectly controlled as with the electric current, enough has been said to indicate the weakness of this system.

The only method, therefore, to be considered in detail is the electric. This divides itself into dynamo, accumulators, magneto-electric, or combinations.

In whatever form it is applied, electric ignition is a notable advance over previous methods. It provides absolute immunity against fire; it furnishes a spark well suited to explosive mixtures, it increases efficiency by enabling the charge to be fired at the moment of maximum compression, and it admits of the employment of higher compressions.

Existing systems of electric ignition admit, among other directions, of improvement on two lines—automatic timing and automatic consumption of current. The timing of the spark should automatically adjust itself to the speed of the engine.

With regard to the period of normal ignition, the author's own view is that it might be well so to dimension the compression chamber and stroke as to produce at the dead points slightly more compression than it is intended to use for explosion, thus allowing the crank to pass the dead point and gather way before igniting the mixture at the working compression point. In any case efficient running greatly depends on accurate ignition, and should be treated accordingly. At present timing is mostly left to hand regulation by the driver; but attention is now being given to automatic spark controllers. A second line for improvement is automatic regulation of the amount of current used. Naturally this is of chief importance where accumulators only are used. At present the flow of current is usually made by a brush brought in touch with a contact piece on a rotary disk. If this contact piece is made of sufficient width to insure the passage of enough current when the motor is running at high speed, it will pass more than sufficient current when the engine speed is reduced. To obtain automatic regulation of the current consumed, and of the time of sparking, the author has suggested using wedge shaped contact pieces on the rotating disk, and allowing the disk under the direction of a governor an in and out movement on the shaft, Fig. 3.

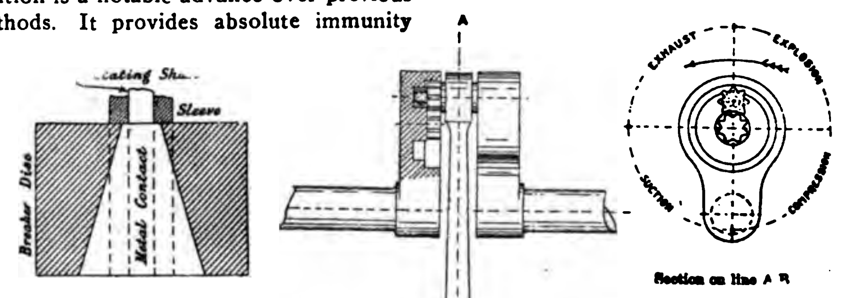


FIG. 3.

SYSTEMS OF GOVERNING.

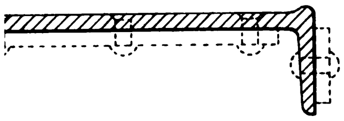
For the purposes of governing, the old "hit and miss," or total cut out arrangement, has practically disappeared. In its place four systems are in use. By far the larger number of automobile motors use a charge volume throttle, usually a valve fixed on the induction pipe, but occasionally in the form of an inlet valve with variable lift. The throttle, worked by hand, or by the governor, or by both, reduce the volume of the charge admitted, and thus slows down the motor. The author has no hesitation in condemning this system as theoretically bad. Incomplete filling of the cylinder reduces the compression, and thus renders the conditions for efficient and economical explosion less favorable. Again, the induction of the charge below atmospheric pressure entails negative work. Thirdly, where jet carburation is used, the mixture is varied. The second system, less general, is the exhaust throttle. The opening of the exhaust valve is retarded, a certain proportion of exhaust gas remains in the cylinder, the inlet valve opens later, and less fresh charge is admitted. In this case, there is a certain amount of back pressure, and the mixture is diluted with exhaust gases; but the cylinder, being fully filled, the compression is preserved, and there is sufficient evidence to show that from this factor alone greater economy results.

(*To be continued.*)

Steel Roadways.

ls for common road vehicles are being laid in Murray street, New posite the City Hall Park. In there is a large amount of ic and the system of steel roadhere receive a very severe test. ewith shows a section of the rail It is essentially a channel form, wide with 3 inch flanges. The ace of the rail is flat, except that slight rounded ridge on either ep the wheels on the rail. The ns are 40 feet long; they are fishplates underneath the rail ie outside of the flanges as indotted lines in Fig. 1. The fishscrewed to the rails by riveting vets have countersunk heads in f the rail. To strengthen the bolts unite the lower part of the ry 13 feet.

ls are spaced with their inner et 6 inches apart and their outer course, 2 feet more. This corto the standard tread for heavy



he entire stone pavement was reom the middle of the street and rails were to be placed trenches about a foot deep. These were with broken stone and the latter ith fine gravel. Before the rails in place they were given a coat vative paint on the bottom and The work was begun on No7 and it will probably take two ore the work of laying the track ted. The track extends for one om Church street to Broadway. l rails were furnished by the tates Steel Corporation and the laying them is superintended by F. Jones, United States Army.

Break Makes a Trip from lumbus to Cincinnati.

lumbus Motor Truck and Vehicle have been in Cincinnati several their large gasoline break, demg it to quite a number of people. k out one of the officers of the i Transfer Company and showed the steep hills in the city could d. This latter company tried a manufactured in Chicago, but wanting.

ing to the driver, the break was igh from Columbus and did very carried eleven passengers to ld (45 miles) in three hours, the ing in fairly good condition in ces, but in bad shape where the n street car lines had the road The run from Springfield to Dayton (27 miles) was made in two hours, at night, through rain, mud and a great deal of gravel, with five passengers. After leaving Dayton, when just outside the city, they twisted a steering post in deep gravel and had to go back for repairs. They made the run from Dayton to Hamilton with seven passengers in one hour and forty-five minutes, a distance of 45 miles. It rained before they got to Hamilton, so they stayed there all night. They ran from Hamilton to Cincinnati, in two hours with four passengers, the others taking the train, on account of the weather. The roads were very bad (one in the party, a Mr. Avery, who has done considerable country driving, said they were the worst he had ever seen). The machine, which weighs about 4,240 pounds, sank in mud clear up to the muffler, but it came through all right.

While in Cincinnati they gave the machine some hill climbing tests, climbing Sycamore street hill and Racine street hill, which are the two steepest in the city. When coming down the last mentioned hill the brake bands got so hot that they burned and expanded and the vehicle could not be held by them at all.

The total running time for the trip from Columbus to Cincinnati was eight hours and forty-five minutes.

Eagle Rock Hill Climbing Test.

The Automobile Club of New Jersey has appointed 10 o'clock as the hour for its hill climbing trials to be held on Thanksgiving Day at Eagle Rock Hill, in West Orange, N. J. The hill is 1¼ mile long, but only 1 mile of it will be used for the occasion. Up to the time of going to press twenty-seven entries had been received.

The United States exports of automobiles during the month of September amounted to $61,849, bringing the total value for the first nine months of this year up to $847,986 (as compared with $206,-802 for the same period last year).

Trade Literature Received.

Steam Carriage Specialties.—Catalogue No. 2 of the John Simmons Company, of 110 Centre street, New York.

"The Automobile" (Panhard-Renault, Mercedes and C. G. & V.)—Catalogue of Smith & Mabley, 513 Seventh avenue, New York.

The Koerting Double Acting Two Cycle Gas Engine.—The De La Vergne Refrigerating Machine Company, of New York (foot of East 138th street).

New Standard Flashlight.—William Roche, 42 Vesey street, New York.

The Universal Drafting Machine.—Catalogue of the Universal Drafting Machine Company, of Cleveland, Ohio.

The "Wizard" Gas Engine Spark Generator.—The Everett Electric and Manufacturing Company, 42 River street, Chicago.

Book Review.

The Automobile: Its Construction and Management. By Gérard Lavergne. Revised and edited by Paul N. Hasluck. Published by David McKay, Philadelphia.

The original French edition of this work appeared about two and a half years ago, early in 1900. It was then about as well up to date with regard to French practice as it is possible to have a book publication. The character of the book was mostly descriptive, although fundamental principles were also treated at considerable length. It is needless to say that of the types of machines built by the end of 1899 very few have survived to the present day, and these have undergone radical changes. In consequence the descriptive part of the book drawn from the original is very much out of date.

Now, it is stated in the preface to the volume before us that "in the endeavor to present a thoroughly up to date work the original book has been rewritten throughout in a more condensed style, and the space thus gained is here occupied by entirely new matter descriptive of mechanisms that have made their appearance within the last year or so." It may be said that this process of eliminating old matter and substituting descriptions of new vehicles and apparatus should have been carried much further than it has. Descriptions are given of any number of motors and of vehicles which never outlived the experimental stage. These descriptions may have been justified two years ago when the respective inventions were first brought forth and when their future and practicability could not be foreseen, but they should have no place in a book claiming to be up to date at the present time. On the other hand, descriptions of vehicles which were up to date last year are very scarce.

Four American gasoline vehicles are described, the Duryea, which ran in the 1895 *Times-Herald* race, the Columbia (no longer manufactured) and "the Bird cars (of Buffalo) and the Mercury cars (of Chicago)." There are probably few men in the American automobile industry today who ever heard of the two last mentioned machines. American steam carriages are accorded four pages of description and illustration, and that not very satisfactory.

While there is a good deal of valuable matter scattered throughout the book, it is mixed with so much that is of absolutely no value at the present time and a good deal that might be misleading that the book is of very little value. Those who have experience enough to judge of what is old and what is new or what is practicable and what impracticable will find very little in the book that is new to them, and to those who have no experience the book can hardly be recommended as a safe guide to modern practice.

...OUR... FOREIGN EXCHANGES

The Anniversary Run of the British Automobile Club.

The anniversary run in commemoration of the passing of the Light Locomotives act took place November 8 from Hyde Park Corner, London, to Oxford, in a pouring rain and a chilling wind. There were about 180 starters out of 220 entries in the event, all save seventeen being gasoline propelled. Many of these were in position long before the start, and three, indeed, had been driven down at 6 o'clock the previous evening, and remained *in situ* all night through to gain the advantage of leading the procession! Drawn up in close single file, the cars extended all the way from Hyde Park Corner to Buckingham Palace road, and even turned round the bend toward the Royal Mews.

About two-fifths of the cars were of native manufacture, and the rest were chiefly French. Of the eighty-seven firms who supplied the vehicles fifty-two were British, twenty-one French, six American, five Belgian, two German, and one Swiss. Of new makes there were but few, but there was a good display of recent patterns of well known brands.

The journey was in five stages, ending at Twickenham, Staines, Wokingham, Reading, and Rosehill (outside Oxford) respectively, and timekeepers at each of these points controlled the traffic and insured an orderly procession. As no car was allowed to travel over any intermediate stage in less than a specified time fast driving was impossible without the penalty of disqualification being incurred.

With so much mud and rain, occasional "short circuits" were to be expected, but for the most part the cars went through in splendid style. Punctures were not numerous, but to make up for the good luck of the majority one car picked up nine nails, and did not reach Oxford until midnight. Over 150 cars were checked to arrive at Reading.

In Wokingham someone had suspended a policeman's helmet by a string across the street, with an appended warning to "Beware of the Police." In Oxfordshire, however, a trap had been carefully prepared 2 miles beyond Dorchester—of course on a deserted piece of road. It was detected by the leading cars, and all the rest were duly warned by a couple of cyclists, who held up a printed notice, with the words "Police trap" to each câr as it approached.

At Goring a contesting vehicle came into collision with a butcher's cart, which resulted in considerable damage. That no other accident occurred with such a large procession of vehicles, mostly driven by private owners, and under the condition of very wet weather, is very satisfactory. The run of 70½ miles was a conspicuous success under trying circumstances.

European Gasoline Motor Data.

In the discussion of Captain Longridge's paper read before the Institution of Mechanical Engineers the following tables were presented. Captain Longridge gave a table representing the variation in temperature in the cylinder during the explosion stroke:

Point of Stroke.......	.2	.3	.4	.5	.6	.7	.8	.9
Mean Fall in Degrees Cent	100	70	99	105	58	76	67	52

Since temperatures correspond to pressure this table furnishes evidence of "the explosive wave" discussed by Mr. Lucke in our last issue:

TABLE OF INLET VALVE DIMENSIONS (FRENCH PRACTICE).

Diameter of Cylinder.	Stroke.	Diameter of Valve.	Diameter of Pipe.
In.	In.	In.	In.
2.36	2.75	.59	.70 to .78
2.56	2 95	.70	.78 to .86
2 75	3.15	.75 to .78	.86
....	3.34	.82 to .86	.90
2.95	3.54	.86 to .90	.94
....	3 93	.90	.98
3.15	4.71	.94	1.06
....	5.49	.98	1.10
3.34	5.49	1.02	1.14
....	5.89	1.06	1.18
3.54	5.89	1.10	1.25
....	6.29	1.18	1.37

TABLE OF EXHAUST VALVE DIMENSIONS (FRENCH PRACTICE).

Diameter of Cylinder.	Diameter of Valve.
In.	In.
2.56 to 2.75	.70— .86— .98 according to stroke.
2.95 to 3.34	.98—1.10—1 25. " "
3.34 to 3.74	1.18—1.25—1.49 " "

Lift.—.196 to .236 for cylinders of 2 36 to 2.75 in.
Lift.—.315 to .354 " " 2.75 to 3.54 "
Ports —May be .196 in. larger diameter than valve.
Pipes.— " about .196 in. " " " port

TABLE OF MAXIMUM MOTOR SPEEDS (G. KNAPP).

—Motor Dimensions.— Diameter.	Stroke.	Revs. per Minute
In.	In.	
2.44	2.75	1,400
2.59	2.87	1,800
2.83	3.15	1,700
3.15	4.72	900
....	4.33	1,000
3.35	5 90	750
....	4.92	800
3.54	6.10	700
....	5.12	750

Annual Dinner of the A. C. G. B. and I.

The Automobile Club of Great Britain held its annual dinner at the Trocadero Restaurant on November 7, at which a number of timely automobile subjects were discussed.

Sir Howard Vincent said that the War Office had decided to purchase twenty-five cars for the use of general officers. That, he suggested, rendered an alteration of the law more necessary than ever, so that the public might be able to identify a general when he went by.

Sir Roger Wallace, K. C., the chairman said that Walter Long had declined to adopt the suggestion that the motor problem might be solved by the issue of certificates to drivers on the ground that it would be too great a business to undertake. He suggested that as the French Government had authorized the Automobile Club to examine English drivers and certify their fitness to drive in France, Mr. Long also might hand over the work to the Automobile Club.

Certificates would have to deal not only with the skillfulness of drivers but their consideration for the public, and they recognized that harm was done to the cause of automobilism by drivers who did not consider the convenience of other users of the roads. But now that Cabinet ministers and lords justices regularly broke the law on motor cars, some amendment was necessary.

John Scott Montagu, M. P., said he believed now they had the Premier as an automobilist the future legislation of the country on the motor car question would be more hopeful. In fact, he believed that the House of Commons today would not reject a reasonable measure.

The Toledo gasoline and Waverley electric carriages will hereafter be sold in England by the Houck Automobile Company, of London.

The Corporation of Eastbourne is inviting tenders for the supply of motor omnibuses, each vehicle to carry not less than sixteen passengers.

A special prize for reliability and regular running in the Paris-Vienna race, for which all classes of vehicles competed, has been awarded to the Werner motor bicycles.

Lord Anglesey, an English automobilist, has invented an attachment for automobiles, consisting of a scent spray which will exude any perfume the driver may prefer. A lordly idea.

M. Buchet, the well known inventor of the "culasse" Buchet and designer of exceptionally light motors for aerial navigation, recently died at his home in Levallois-Perret, near Paris, at the early age of forty-two years.

French tire manufacturers have been organized into a trust which controls twenty-two factories. The firm of Michelin does not belong to the trust. According to another report it is simply a trade organization, a "chambre syndicale."

The Belgian consul in Melbourne, Australia, calls the attention of manufacturers of automobiles to the possible field for motor mail and express vehicles in the colony of Victoria. The present mail service is very defective on account of the large distance which must be covered by the mail carriers, and the Minister of the Postal Department is said to favor automobiles.

LEGISLATIVE AND LEGAL.

tuation in Westchester County.

y in Yonkers but in all the Westchester County the speed : State law is to be very strictly rom now on, according to re- ts. Automobilists going north York will therefore do well to ir guard and to run cautiously wns. In Yonkers the effect of arrests is making itself felt; au- ; seem to avoid the town as possible and those who do run here run their machines very n a recent Sunday only seven atos passed through the town in on. while formerly the number d on a Sunday sometimes ex- , it is said. And this in spite of iat the weather was ideal for a unt.

er of prominent automobilists of were seen regarding their views nation. Charles R. Otis, of the ator Company, thought that the mobilists would suffer no incon- rom a strict enforcement of the 8 in the town. "Eight miles," he very good speed for a place like which is an exceedingly busy streets being literally black with certain hours of the day and in g. This is true of all the central e city. Most of the speeding in is done by New York automobil- ass through here on their way to and other points north. There many automobilists in this town of them are quite conservative, here are young men who are o overdo the thing. On South , where the last arrest was made, grade and fine pavement offer a n to let the machines out. and ttle higher speed might not be so able in this part, of course the not make one speed rule for one a different one for another.

: owned several automobiles, and experience has impressed me with ssity of caution on streets en- ith traffic of different sorts. At I drove along a street toward a trolley car. I had made reason- : that there were no passengers n and off—the car seemed to be owing to some kind of trouble— eeded to pass by, when all of a lady stepped from the car platform tly in my way. The only thing I was to turn into the curb as ab- possible. In this manner an ac- as averted, but I would not go the same experience again for a ollars. Another time a lady on a bicycle riding ahead of me got in my path just as I was about to overtake her, although I had previously warned her, by tooting, of my approach. While I have never had an accident, these incidents have fully shown me the necessity of careful driving. Of course, in many cases the other people are solely to blame, but even under these conditions it is most unpleasant for an automobilist to contribute to an accident."

Mr. Otis stated that he enjoyed automobiling very much; he has operated successively various machines of different makes and motive powers, and has become interested so much that he is now building a special gasoline carriage himself.

A Lesson to Minneapolis Aldermen.

An automobile ordinance was introduced in the Minneapolis City Council on November 14 by Alderman C. B. Holmes, on behalf of the Minneapolis Automobile Club. The chairman of the council appointed one alderman from each ward as a committee to investigate, and the club extended an invitation to them for a short automobile ride to demonstrate speed, etc. The demonstration took place on November 18 at 3 o'clock p. m. from the City Hall up Nicollet to Thirteenth street, over to Third avenue, down to Tenth street, over to Park avenue, out and around Lake Harriet. About twenty automobiles participated and fifteen aldermen and some other city officials took part.

The Topeka, Kan., board of aldermen will increase the auto speed limit, proposed at 6 miles.

The board of freeholders of Burlington County, N. J., has passed an ordinance regulating the speed of automobiles and all other vehicles.

In the case of Luther E. Mull against Park Densmore at Rochester, N. Y., the complainant was awarded $25 damages; he sued for $300.

In Waterloo, Iowa, an automobile ordinance passed its first reading November 10. The speed limit is 8 miles per hour; lamps are required.

The lower house of the Vermont Legislature on November 14 concurred in the amendment to the State automobile law raising the speed limit from 12 to 15 miles an hour.

At Reading, Pa., on November 14, four occupants of an automobile were arrested for driving without a light after dark. There is no special automobile ordinance in force in Reading requiring a light.

The Supreme Court has rendered a decision against the summer residents of Arverne, L. I., who contended that the restrictions on their home property would prevent the erection by others of auto barns. The auto barn is held to be no nuisance.

At Columbus, Ohio, Tabbie McSavaney has brought suit against Henry M. Neil for $5,000 damages, claiming that about a year ago the defendant ran into her buggy with his automobile, tore two wheels from her buggy and threw her to the ground, breaking her right leg.

Richmond, Va., November 18.—The House committee on roads and navigation today reported favorably a bill to regulate the speed of automobiles. The speed is fixed at 15 miles per hour, with 4 miles at points where wagons or horses are met. A fine of $10 to $100 is provided for violations, together with liability for damages resulting from violations.

A committee of the West End Association, of New York, recently called upon the District Attorney to direct his attention to the increased speeding of automobiles on the upper West Side. Mr. Jerome stated that he would not countenance any violation of the speed ordinance and would see that adequate punishment would be meted out on conviction if violations were brought to his attention.

William F. Pierce, Charles H. Wilson and Eugene K. Kennedy, who were arrested in Boston some time ago for speeding, on November 17 retracted their plea of not guilty, and pleaded guilty, in the Municipal Court, and each paid a fine of $10. A test of the machines of the three men showed that when they were regulated for 6 miles an hour they ran 10 miles, and when regulated at 10 miles they ran about 16 miles an hour.

Madison, N. J., November 21.—W. H. Dutton, who keeps the auto station at Morristown, N. J., had a singular experience the other day at Madison, a nearby town, that has an 8 mile ordinance. He was coasting down hill into the town with the power off, at the rate of about 8 miles an hour, according to his statement, when he was stopped by a policeman and requested to repair to the house of the village squire to answer to a charge of breaking the auto ordinance. After a brief interview Squire Edward L. Cook told Mr. Dutton that as he was known he could go on if he was in a hurry and if they wanted him they would let him know. The next morning Mr. Dutton was surprised to find on opening his mail a bill for $26.70 from the borough of Madison, covering fine for violation of speed ordinance, and costs. No steps have yet been taken by the town to collect the "bill," and Mr. Dutton's attorney informs him that it cannot be collected. Mr. Dutton thinks he suffered for the sins of another, inasmuch as a big red machine went through ahead of him at a very high rate of speed.

NEW VEHICLES AND PARTS.

The 1903 Model Sixteen Horse Power Peerless.

Prominent among the new models of American automobiles is the Peerless touring car, manufactured by the Peerless Motor Car Company, Cleveland, Ohio, and now on exhibition at the salesrooms of the Banker Brothers Company, West Thirty-eighth street, New York, sole agents in this section.

The car has the well known French tonneau type of body, with motor placed in front under a removable hood.

The motor is rated at 16 horse power when running at its normal speed of 900 revolutions per minute. The speed, however, is capable of acceleration to 1,200 revolutions, the horse power increasing proportionally. The two cylinder vertical engine is a single unit, the cylinders, water jacket and cylinder heads being but one casting, thus obviating all troubles arising from gas or water leakage.

The cylinders are 4½ inch bore by 5½ inch stroke, with pistons and cranks so arranged that they are balanced by the explosion rather than by the engine. That is, the cranks instead of being set opposite each other are side by side, both pistons therefore rising and falling at the same time, the explosion in one, however, being one revolution behind the other.

The inlet valves are so constructed that by simply loosening a set screw the valve and seat may be removed together, thus facilitating grinding and replacing the same. They are of the well known poppet type. The exhaust valves, which are cam operated, are placed directly under the admission valves and are removed through the same opening.

THE ENGINE SPEED

is regulated by a centrifugal ball governor, gear driven, which acts on a throttle valve placed between the motor and the carburetor. This throttle valve is located in the inlet valve casing, the object being to always have the pipes betwen the carburetor and valve filled with an explosive mixture. In this way it is claimed the governor takes hold immediately, not having to draw on exhausted supply pipes for a fresh charge of mixture. The carburetor follows the general lines of the De Dion, but with the addition of several improvements. To accelerate the engine the governor is thrown out by means of a pedal, seen in the cut to the extreme right and close to the dash. The engine speed is rendered very elastic by regulating the mixture in the carburetor and an ignition shifting device. The control of these is accomplished by two small levers placed on the steering wheel standard.

IGNITION.

Ignition is electric of the jump spark type. Each cylinder has an independent Splitdorf coil, thus preventing both cylinders being rendered useless by the failure of the coil to work, which would be the case if but one coil were used.

Special attention has been given to the design of the vibrator; two vibrator springs and cams are provided for each cylinder, so that failure to work is reduced to a minimum. The batteries are arranged in two sets of dry cells enclosed in a strong wooden box and carried on the right hand step.

THE WATER COOLING DEVICE

is of a form peculiar to this carriage. The water tank consists of two parts connected by the vertical side tubes, seen in the cut and placed in the front part of the hood. A gear driven pump A (Fig. 1) draws its supply from the lower section of the tank B, pumps it through the zigzag tubes C into the cylinder jackets D, from where it enters the upper section of the tank E, falling from there, through the vertical tubes F F, into the lower section.

The upper section, receiving the hot water immediately on leaving the jacket, is provided with a steam vent, so that by this system of circulation any possibility of a steam pocket forming is completely done away with. The whole system holds about 4 gallons of water, sufficient for a day's run.

The front radiating tubes are of a form just coming into prominence and seen on the latest Panhard machines and a few American cars. They consist of a number of small tubes, about a quarter of an inch in diameter, laid side by side and bound together, the whole comprising a sing
The radiating flanges are made suffi
wide for each flange to encircle a
group of tubes. A section of a g
tubes would have the appearance of

Connection between the moto
change speed gears is through a
driven clutch operated by a foot p

The clutch is of the internal con
It is so constructed that when the c
fully in, all thrust due to the spring
absorbed, no pressure being exe
the engine bearings.

BRAKES.

The carriage is equipped with t
of brakes. One brake operating
drum attached to the driving shaft
plied by a pedal which by means of
ing device with the clutch pedal
out the clutch before the brake is
The other is an emergency brake
on the two rear wheels and applied
outer hand lever seen in the cut
emergency brake lever also throws
clutch before the brake is applied.

To set the emergency brake the l
pulled towards the operator as opp
many of the present cars, which p
lever forward, the contention bein
one's instinct is always to pull on
or handle to stop suddenly rather
push it from one.

THE STEERING MECHANISM

is irreversible, operated by a hand
It consists of a nut moving on a thr
on the steering wheel rod. The
moving swings a bell crank, whicl
municates its motion to the wheel
through the connecting rods and b
socket joints. As in the previous
of the Peerless cars the steering
swings back to be out of the way or
ing the car; locking itself when draw
into position.

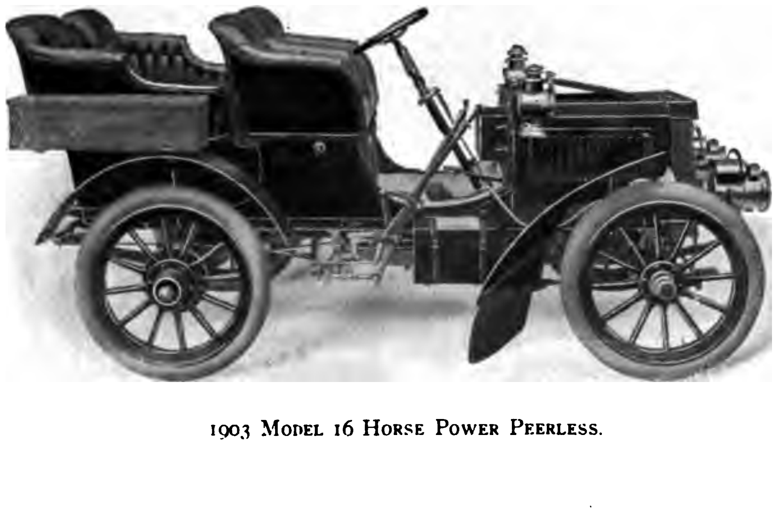
The car has three speeds forward
reverse, the speeds being 10, 20
miles per hour forward and 10 m
verse. The gears are of the slidin
and are cut from special steel blan
hardened.

Starting from the reverse positi
notches on the gear shifting lever s
are: Reverse, first speed forward,
position in which all gears are out o
second speed forward, and third spe

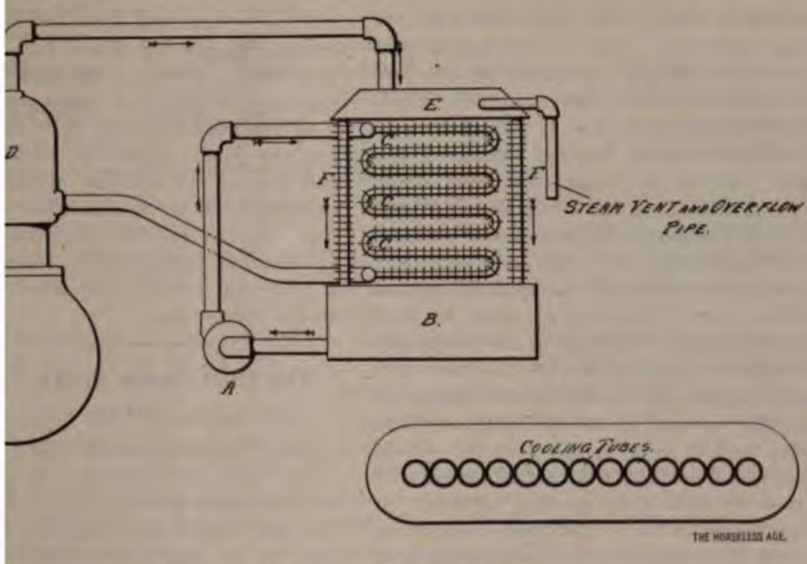
All the forward speeds and the
are operated by but the one hand
making the operation of the car as
as possible.

INTERLOCKING DEVICE.

An ingenious interlocking devi
vents the speed gears being change
out first throwing out the clutch, th
guarding against the gears being s
When the clutch is in, a pin whicl
tegral with the clutch mechanism
into a hole in a segment carried
gear shifting lever. The segment
hole corresponding to each positio
gears so that no matter at what sp



1903 MODEL 16 HORSE POWER PEERLESS.



SKETCH OF PEERLESS COOLING SYSTEM.

t the pin slips into the segment
.
e this pin the clutch has to be
ther by the clutch pedal or the
brake lever, so that it is im-
shift the speed gears without
ng out the clutch.
transmitted to the rear wheels
of a bevel drive and live rear
design of which special atten-
en given to secure ease of run-
trength. The two sections of
provided with universal joints
is perfectly flexible, with no
training on rough roads. The
hroughout are three-quarter
alls, thus making liberal allow-
aximum strength.
are automatically lubricated by
oil pump placed at the left of
ell out of the way, and so leav-
h, the customary place for the
ce, unencumbered and much

ls are 34 inches, artillery pat-
with 3x3½ inch Diamond
tires. The wheel base is extra
g easy riding, the gauge being
, 54 inches.

FRONT VIEW.

An option of an 8 or 12 gallon gasoline tank is given. Each size, however, allows a sufficiently great radius of action, as the engine consumes but 1 gallon of gasoline for 15 miles.

The frame is of iron construction, being built of but two pieces of standard channel iron. The springs are semi-elliptical, supported on the two ends of the frame by extension C irons and provided with rubber bumpers, which add to the ease of riding.

The carriage body is finished in either red, blue or green, as desired, with the best quilted leather upholstering, the tonneau being especially roomy and comfortable. The tonneau is removable, leaving space for a racing back to be put in its place.

The New Orient Runabout.

The new Orient runabout, illustrated herewith, differs considerably from the last year's model. The new 1903 model has been widened 4 inches and the carriage is now of standard tread. Gear and body have also been lengthened, and the body has a folding seat on the front, under which is room for wraps, parcels and tools. The body is finished in black and has a maroon gear. The company will substitute artillery wheels at a slight extra charge if ordered. The motor has been made larger and now has a 4 inch bore and a 4½ inch stroke. The body is hung on rubber cushions, independent of the body frame, and is said to be absolutely free from vibration. The vehicle has a one lever control. Moving the lever forward starts the machine forward, and pulling back on it puts on the brake; and if the lever is held in the reverse position the carriage will go backward. The power is governed by a foot throttle device on the gasoline pipe and governs the amount of gas admitted to the motor, and this with the spark changing lever on the steering post makes the vehicle very easy to handle and simple for the beginner to learn.

The "Wizard" Gas Engine Spark Generator.

A magneto generator for gas engine ignition, especially for automobiles, is marketed under the above trade name by the Everett Electric and Manufacturing Company, of Chicago. The machine is said to have very powerful field magnets, which admits of running at comparatively low speed, thus saving wear, and also of starting small engines, which can be turned over rapidly, without the use of a battery. A special feature is claimed to be the brushes for collecting the current from the commutator. Double sets of brushes are employed and are arranged in such manner, it is claimed, that there is always positive contact with the commutator. The machine is entirely enclosed, but ready access may be had for inspection of the brushes and commutator.

THE 1903 MODEL ORIENT RUNABOUT.

Pennington's Latest Scheme.

The American Automobile Company, of London, England (American Works, Racine, Wis.), the latest promoting scheme of the notorious E. J. Pennington, is sending out and has been distributing at the recent Tri-State Vehicle Show at Cincinnati a circular addressed to the carriage trade, which reads, in part, as follows:

"Do you want to make money? If so, come and see us. Instead of making less than $100 on each vehicle, why not triple it by buying one of our automobile attachments by which you can realize from $200 to $400 profit?

"We are not automobile or carriage builders, but we build the automobile horse or locomotive which is applied to the horse drawn vehicle the same as is a horse —viz., we draw and steer with our locomotive attachment applied to any horse drawn vehicle as does the horse.

"We are the oldest automobile manufacturers in England and amongst the oldest on the Continent, having devoted over twelve years to the business. We have also taken out over 400 patents throughout the world on automobiles, etc. * * * Our shareholders in England have decided to spend $1,500,000 in putting in more machinery and equipment, so that by next year we hope to be able to turn out 50,000 locomotives. We have now over sixty customers in this country—none of them ordering less than 100 outfits—and shall have over 400 by March 1.

"Everybody that wishes to make money and be in the swim should get in line, as we give exclusive territory, and it is being taken up very fast."

The scheme of giving exclusive territory —for a cash deposit—has been "worked" before in the automobile line in this country by irresponsible parties, and it is to be hoped that none of the vehicle dealers or vehicle manufacturers may fall into the trap laid for them. Pennington has been exploiting the ignorance of the general public in motor matters for over a decade; he has organized in succession the Pennington Motor Foreign Patents Syndicate, Limited, the Anglo-American Rapid Vehicle Company, the Pennsylvania Steam Vehicle Company, the American Automobile Company, etc., with an aggregate capitalization of over a hundred million dollars, but is not known ever to have placed a practical vehicle in the hands of a purchaser. None of his vehicles have ever taken part in any road contest in this country, nor abroad as far as our knowledge goes, and in view of this fact the vehicle men will do well to think twice before they listen to the claims of this combine. If they want any further particulars about the career of Pennington the back volumes of THE HORSELESS AGE will be of service to them.

PENNINGTON'S LATEST FREAK.

Special Motor Truck Wanted.

The Compressed Air House Cleaning Company, of 1133 Broadway, New York, is in the market for a special truck which is to be propelled by either a steam engine, explosion or compressed air motor. The company makes a specialty of cleaning houses by means of compressed air, so that the vehicle will have to carry the apparatus to the building which is to be cleanod, and then pump air all day long to supply the apparatus.

As soon as the scene of the day's operations has been reached the driving mechanism is uncoupled from the engine, which is then called on to drive the air compressor. The latter must have a capacity of 100 cubic feet per minute and deliver the air at 100 pounds per square inch. The truck must have a maximum speed of 6 miles per hour and have sufficiently large receptacles for water and fuel to last for ten hours, which constitutes a working day and includes the time spent en route. Ample provisions must be made for cooling the jacket water of the compressor and that of the working cylinder, in case the engine is of the internal combustion type. At present the company is using a horse drawn truck, which is equipped with a boiler, a Jenkins kerosene burner and an air compressor.

The Huff Jump Spark Coil and Plug.

The Crescent Machine Company, of Detroit, Mich., are placing upon the market a line of apparatus for jump spark ignition. The coil is put up in an oak case and is said to be thoroughly insulated with a special insulating compound. The coil is provided with a magnetic trembler or buzzer which has platinum contact points, that in the contact screw being of No. 12 B. and S. gauge. The current consumed while running is .6 ampere and the coil will produce a spark three-quarters of an inch long in the atmosphere.

A feature of the plug is that it has nickel steel instead of platinum points. The centre electrode is fastened at one end only and the cap which holds it in place is spun on the porcelain insulator.

Automobiling in the Desert.

Two Salt Lakers came rushing into Grantsville the other day on an automobile, the first one that has entered our little burg, passing through here on their road to the Deep Creek country. After getting supplies from the co-op. store, they proceeded on their journey. The next day they returned with the auto hitched behind a wagon and team. It appears they nearly got to the desert when they broke down and had to return, procuring help from the Kanaka ranch in Skull Valley. The car is now stored away at the Fawson House, while the parties have gone by team to their destination.—*Salt Lake Tribune.*

Automobile Accidents.

The steam surrey of W. H. Cushmann, of Gallipolis, Ohio, was wrecked by fire on November 16, when stopped on the street. No one injured.

Albert Swing, of Batavia, Ohio, was severely bruised and cut near Perintown, Ohio, on November 9, when he was thrown from an automobile which skidded and struck a telephone pole.

Four residents of Wheeling, W. Va., took a moonlight automobile ride during the night from November 12 to 13. At West Alexander they ran at high speed into excavations for a trolley car line, which caused the vehicle to turn a somersault and throw the occupants out. No injuries beyond serious bruises.

INOR
ENTION

:outy Company, Lansing, Mich., ng a gasoline farm truck.

ilwaukee Automobile and Brass Company has given notice of n.

Brothers will build a new storage : 629 to 633 North Broad street, hia.

agency for the Renault gasoline has been opened on Stanhope ›ston.

red T. Merrill Cycle Company, Wash., will erect an auto storage building soon.

Trice, of Winfield, Kan., has purtwelve passenger 'bus of the Chitor Vehicle Company.

lings in involuntary bankruptcy n taken against the Remington ile and Motor Co., Utica, N. Y.

vis Engine and Machine Works, Mich., are building a 10 horse soline engine with opposite cylin-

S. Kelly Company, Springfield, testing with good results a steam esigned by O. W. Kelly, of the

ruickshank Motor Company, of Conn., has begun operations in its t, although the machinery is not aced.

chols Kerosene Motor Company, York, has been incorporated in to manufacture kerosene motors; ,000,000.

Brothers, Orange, Mass., report of their 6½ horse power maecently climbed Mt. Wachusett, hburg, Mass.

Bornot & Brother, Philadelphia, ite building an automobile house, t, on the south side of Melon low Seventeenth.

nnington "American Automobile ," of Racine, Wis., is reported to uired the plant of the Racine ufacturing Company.

airs of the Illinois Electric Vehiportation Company will be setfew weeks; stockholders will re) per share of $5 par value.

it Utica, N. Y., the sheriff has the property of the Remington le and Motor Company. A reon of the company is talked of.

n to establish an automobile 'bus ncinnati has been abandoned. A of Western construction was it the streets proved too hilly

nilton, Ohio, Charles Schmitt, with the South Side Cycle Com- St. Louis, is fitting up a shop to the repair of automobiles and motor cycles, as the "West Side Motor Company."

Dr. F. W. Brandour, of Pittsfield, Mass., has constructed a 12 inch model of a Winton touring car, which, it is reported, he will exhibit at the Madison Square Garden Show.

The Waltham Manufacturing Company, Waltham, Mass., are building an addition to their factory. Next year they will sell their 3 and 8 horse power motors to the trade.

The Jackson Automobile Company, Jackson, Mich., are building a single cylinder gasoline carriage, which embodies a number of new features, including a new governor.

The Monmouth County Automobile Club has been organized at Asbury Park, N. J., with Dr. J. F. Davison as president and eleven members. The fee for life membership is $100.

George A. Mason, who was tried at Buffalo last week for running over and killing an old man with his automobile, was acquitted, as it was shown that he was in no way to blame.

The Gearless Motor Vehicle Company, capital, $125,000, is a recent New Jersey incorporation. The incorporators are William K. Bassford, Jr., Louis Heck and Charles Isbills.

Dr. Frank W. Brandow, president of the Berkshire Automobile Club, with the assistance of Louis E. Laflin, has built a model of a Winston touring car, 12 inches in length and weighing about 3 pounds.

The Duryea Motor Company inform us that they are not contemplating the removal of their Reading factory to Waterloo, Ia., the factory to be established at the latter place being simply a branch for the Western trade.

The plan of a national military highway from Boston via Chicago and Salt Lake City to San Francisco, as originally suggested by Gen. Nelson A. Miles, was discussed by and met the approval of the A. A. A. at its meeting on November 17.

Bates Brothers, Incorporated, have opened an automobile emporium at 145 Columbus avenue, Boston, Mass. They have the local agency for the St. Louis Motor Carriage Company, the E. R. Thomas Motor Company, and A. L. Dyke.

The Sterling Power Vehicle Company, it is reported, has secured property at Cleveland, Ohio, and will break ground there for a factory. All the machine tools will be driven by electric motors. As reported in another column, the company will build only delivery wagons and trucks.

The Hawkins Automobile and Gas Engine Company has been incorporated at Houston, Tex., with $20,000 capital. The purpose of this corporation is the buying and selling of automobiles, gasoline and other engines. The incorporators are C. Bender, Jr., A. I. Saliers and George W. Hawkins.

Recognizing the demand for solid rubber tires the Fisk Rubber Company, Chicopee Falls, Mass., has completed arrangements to represent exclusively the Firestone Tire and Rubber Company in the cities of Springfield, Syracuse, Buffalo and Detroit.

Mrs. A. Sherman Hitchcock and Miss Rose L. Downes, of Providence, R. I., made a 100 mile run on Thursday, November 20, in an Oldsmobile with but one stop (for lunch). They are the first ladies of Providence to drive a gasoline machine, and report a very delightful trip.

The American Coil Company, West Somerville, Mass., are at work on a magneto for motor bicycles and a pocket ammeter. Parties visiting the company's works would do well to get off the train at Somerville Highlands depot and walk down, as it is much nearer than via the West Somerville station.

"Captain Pearson," an Englishman, who introduced himself at the A. C. A. as a relative of the secretary of the A. C. G. B. and I., and was later on arrested at the instance of Secretary S. M. Butler, of the A. C. A., for obtaining money under false pretenses, has been sentenced to one year imprisonment and a fine of $250.

We learn that the factory purchased by the American Manufacturing Company, at South Braintree, Mass., is not for the manufacture of auto parts, but for a foundry for the casting of Babbitt metal, etc. The manufacture of spark plugs, coils, etc., will still be carried on at the corner of Atlantic avenue and Congress street.

The police departments of Springfield and Cincinnati, Ohio, are contemplating the purchase of auto patrol wagons. The Cincinnati officials are said to be a unit in favor of the auto and will advise the purchase of three seating twenty-two persons each. At present there are ten patrol houses in Cincinnati, each equipped with two teams of horses, one for day and the other for night service.

William Roche, of 42 Vesey street, New York, has brought out a dry battery with miniature electric lamp attached, the whole being conveniently arranged in a cylindrical box, with the lamp at one end and a press switch on the other. The device, called a flashlight, is especially recommended for use around automobiles carrying gasoline, as it insures the greatest degree of safety. The dimensions are 9½ inches in length and 1⅝ inch in diameter; weight, 1 pound.

The State road in Westchester County has been completed as far north as Bedford Township. The county has appropriated its share to extend the State road to the county line at Peack Lake. The next session of the Legislature will be in January 1903. The contract will be let in April. The road so far completed is in excellent condition for automobiling, and it is the intention of the State to extend the State road from Peack Lake across the northern section of Westchester County over to what is known as the Sawmill River Valley; thence on into Tarrytown.

Non-Freezing Mixtures.

By Frank W. Ross.

I notice in an article in the current issue A. L. Clough a very able and sensible writer, referring to non-freezing mixtures, states that some unscrupulous chemists "have given chloride of lime" for chloride of calcium.

Allow me to say that as a rule such mistakes are the fault of the purchaser.

If chloride of calcium is called for, chloride of lime will never be given. The fault lies in the asking, not in the chemist.

"Chloride of lime," so called, which is only ordinary lime unslaked, impregnated with the vapors of chlorine, is not really "chloride of lime," only a trade or common name for chlorinated lime. The wise purchaser, who knows just enough of chemistry to not know the difference, asks for chloride of lime instead of chloride of calcium, and the chemist, not being a mind reader, and not knowing the use for which it is intended, gives the common chloride of lime, used ordinarily as a disinfectant. The calcium chloride is not always kept in the drug stores, and should the purchaser tell the use he intended to make of the salt the mistake would never be made.

I have known the same mistake to be made by physicians who use static electricity, purchasing the lime to place in a machine to absorb moisture and keep glass plates dry, with unhappy results.

Chloride of calcium should always be strongly alkaline; it will not corrode iron or brass. I do not think it will require over 2 or 3 pounds to the gallon or less to prevent freezing; the water constantly evaporating leaves the mixture with varying strength of the salt. If there is too much calcium when water is low, the solution will be so heavy it will become hotter and consequently use more oil, with greater tendency to overheating cylinders. This danger may be modified by extremely cold weather, but I think it will be best to have just enough of calcium to prevent freezing, and not enough to impede the circulation or increase density. It is best to have pure calcium, as the impurities of commercial calcium might be detrimental to metal. In the pure state it costs about 35 cents per pound, and is clean, white looking, not unlike broken up white sugar candy, "taffy," as seen in the shops.

The calcium may be used indefinitely, is readily soluble and has great affinity for water. The solution drawn off at the end of the cold season, if boiled for a number of hours, will again become solid and can be kept until next year if desired. Keep in cans of tin or glass.

In my static electric machines I find the more I bake my calcium and the drier it is the better. Repeated and prolonged evaporation and baking very much add to its moisture absorbing qualities.

GLYCERINE.

About a pint of glycerine to the quart will also make a good non-freezing mixture, and I think much less will be sufficient.

The exact amount required of either calcium or glycerine can be determined by actual experiment with solutions of different density. My impression is that a pound to the gallon is sufficient to prevent freezing in all ordinary weather.

I do not doubt that such experiments have been tried, but do not personally know of them. It will be easy to make the test in any laboratory, or by anyone in cold weather, making solutions of different density of calcium chloride, and exposing to extreme cold weather, noting effect.

It is my intention to make such experiments this winter, unless I find someone has already done so. To test the point in question from a practical standpoint, we can be sure that the very least possible amount necessary, placed in the water, when pipes and tank are full, will be all that is required, as the evaporation of water will always leave the solution stronger, and more than enough, and the lower the water in the tank the better non-freezing mixture is left, but in all probability the poorer cooling solution or circulating medium.

As the salt would begin to become solid and recrystalize if water is evaporated too much, this solution will require more careful watching of the water supply.

The Whitney Gasoline Machine.

The automobile company which has been developing a gasoline machine at Whitney's Point, N. Y., has completed the first model, and is now testing it on the road. A machine will be built for exhibition at the Madison Square Garden Show, and the name of the company will be changed to the Whitney Automobile Company, Whitney's Point, N. Y. The machine will be called the Whitney.

State Organization Proposed.

A proposition has been advanced by F. H. Elliott, secretary and treasurer of the Syracuse Automobile Club, to organize all the clubs in the State of New York into one organization, to be known as the Associated Automobile Clubs of New York. The object of this organization would be to further the common interests of the movement by representation at Albany, and in other ways that might suggest themselves. The plan is that the officers of the individual clubs constitute the State organization, an advantage of this plan being claimed to be that as clubs periodically elect new officers, new ideas would constantly spring up in the State organization with the change of its individual members. Most of the clubs of the State are said to have received the suggestion with favor.

Look for DOCTORS' NUMBER, January 7.

Legislative and Legal.

Dubuque, Ia., November 18.—A tomobile ordinance is in contemp There are only three or four machi the city, but there will be several next year.

Chicago, November 21.—Franl Mudd, of Austin, was arraigned tod speeding his automobile; he pleaded and was fined $5.

Wellington, Ohio, November 18 for $2,000 has been brought by Mrs etta Bliss against Robert Nooney a wife for injuries received in a hors away, alleged to have been caused fendants' automobile.

Cooperstown, N. Y., November The suit of Dr. L. R. Morris, of York, against the Automobile Comp America will come to a trial her week. Complainant purchased a m from defendant last summer for $4,5 which he paid $2,500. He refuses the balance, and wants the mone down back, claiming that the macl unsatisfactory.

Jamaica, L. I., November 18.— Crocker, the chauffeur of Reginald derbilt, appeared in the Court of Sessions here today to plead to a of having violated the automobile law. He claimed he was running miles per hour when arrested.

Yonkers, N. Y., November 21.— Wood, of New York, was arreste today for driving an automobile on avenue at high speed (18 miles pe it is claimed); he was released by Kellogg in $500 bail for appearar morrow at 10 a. m.

Atlanta, Ga., November 12.—Ar nance will be introduced in the cou the next meeting, imposing a hea on crossing the Whitehall viaduc greater speed than that of a horse the ordinance applying to all whee hicles.

Freeport, L. I., November 21.—T lage has erected signs on the more tant streets at the village limits to i to automobilists where the 8 mile a district begins.

Paterson, N. J., November 2 suit brought by Mrs. Lizzie Wh against Robert B. Holmes, of Orang come up in the January term of th saic County Circuit Court. The su out of an accident in which the complainant, riding on a bicycle, c with the automobile of defendant, ing in the death of the former.

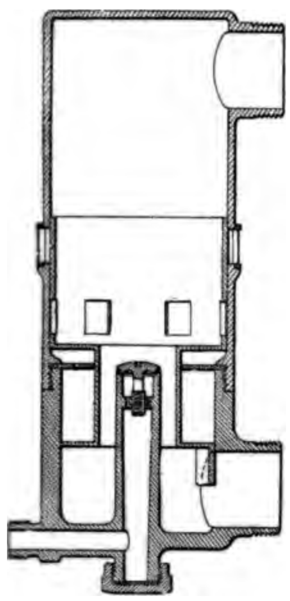
R. R. Ross and Mr. Bryant, of recently made a trip from New Yo to Boston in the latter's Model F touring car. They left the storage at 127th street and Seventh avenu York, at 5:30 a. m., November arrived in Boston at 7:30 p. m. th day. They claim that they did n the engine during the entire run.

OTOR VEHICLE ATENTS..

United States Patents.

:46. Vaporizing Carburetor.—Wil- 1. Power, of Montclair, N. J. No- r 11, 1902. Filed December 27,

carburetor comprises a regulating the position of which is dependent the velocity of air passing through arburetor, which regulating valve

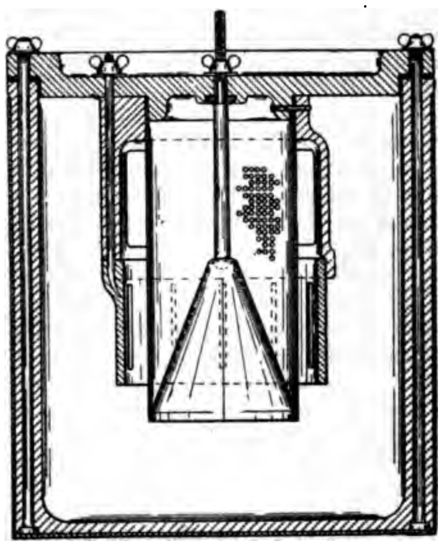


atically permits a gradual dilution mixture to be effected as the speed ses, to thereby counteract the in- in the proportion of hydrocarbon, an increase in the velocity of the ssing through the carburetor.

casing of the carburetor is made of rts screwed together, the lower sec- eing provided with a main air inlet a inlet connecting with the vaporiz- zzle. At the top of the vaporizing is a plug for properly spraying the arbon in the usual way. The bot- f the nozzle is provided with a re- le plug for the purpose of cleaning. ted in the casing of the device is a ting valve, comprising a tubular and flanges. A disk is seated be- the upper and lower sections of the and surrounds the tubular body of lve, said disk being provided with r more openings therein, whereby ovements of the valve will be re- and sudden fluctuations thereof ted. The upper flange of the valve a skirt having a series of openings adapted to register with openings body of the casing when the valve vated. The lower flange of the ting valve carries a diaphragm, partly throttles the main air open- o that at the starting operation a limited amount of air will be permitted to enter the carbureting chamber. A ring having openings therein is mounted on the upper section of the carburetor, so that by moving the ring circumferentially the area of the openings in the upper part of the carburetor casing may be varied.

713,174. Voltaic Cell.—Herbert B. Taylor, of Newark, N. J. November 11, 1902. Filed April 2, 1902.

The invention comprises a jar of acid proof insulating material, such as hard fibre, which is pressed into a jacket of sheet metal. The jar at its upper edge



has a narrow outside flange, which comes flush with the jacket. This method of lapping the jar over the jacket makes it impossible for any of the solution contained in the cell getting between them. The jar protects its covering from attack by the solution, while the covering protects the jar from damage from the outside. The cover is of the same material as the jar, and is flush with the sides of the jar when placed thereon.

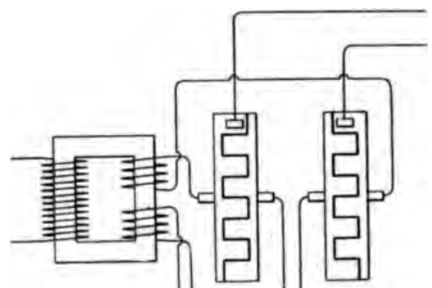
The cover is held in place by bolts extending lengthwise through the walls of the jar and wing nuts on these bolts.

A cylindrical container of perforated metal fits snugly on the outside of the ring projection of the cover and is permanently secured thereto. The bottom of the container is made in the form of a frustum of a cone of copper. The frustum has attached to it a shouldered rod clamped into the cover. There is also attached to the cover the separator or insulator of the same material as the jar, which fits snugly the outside of the container at its upper end and is secured, with the said container, to the cover by the clamp spring. The function of the separator is to support the positive element of zinc, to separate it from the container and to hold it suspended in the position shown.

The depolarizer used will be cupric oxide, properly treated and pressed into small cakes or pellets of about one-quarter inch in diameter and one-quarter inch long.

713,284. Rectifier.—Harold W. Buck, of Schenectady, N. Y. November 11, 1902. Filed October 17, 1898.

Two similar sources of alternating current of equal electromotive force are made use of, the drawings showing the sources



to be separate secondary windings of a transformer. One of these sources is first connected into the work circuit, and after operating until its electromotive force has become zero another source, with its terminals reversed, is then connected into the work circuit in parallel with the first source. Upon the hypothesis that the work circuit is reactive the current in the first source will not follow the impressed electromotive force, but will either lag behind or be advanced in phase with respect to the impressed electromotive force, so that when the impressed electromotive force becomes zero there will at that instant be a current flowing in the first source of a value depending upon the amount of reactance. The second source of electromotive force is connected with the first in a direction such as to oppose a continuation of the flow of current in the first coil in its original direction after its impressed electromotive force has changed sign. It should be remarked that the two sources of electromotive force, although in parallel when considered with respect to the work circuit, are in series when considered with respect to each other. If the circuit of the first source be interrupted within the interval occurring between the instant when its impressed electromotive force becomes zero and when its current becomes zero, an induced electromotive force in the same direction as the current will be produced of a value roughly proportional to the value of the current. Within the interval mentioned the current of the first source decreases to zero, while the impressed electromotive force of the second source increases from zero. A point may therefore be found where the induced electromotive force, due to disconnecting the first source at the value which its current then has, is exactly equal and opposed to the resultant of the impressed electromotive forces of the two sources or, in other words, to the impressed electromotive force in the local circuit. If at this instant the terminals of

the first source be disconnected, no sparking will take place, because of the balanced electromotive forces then existing.

713,313. Automobile.—Alvaro S. Krotz, of Springfield, Ohio. November 11, 1902. Filed April 22, 1902.

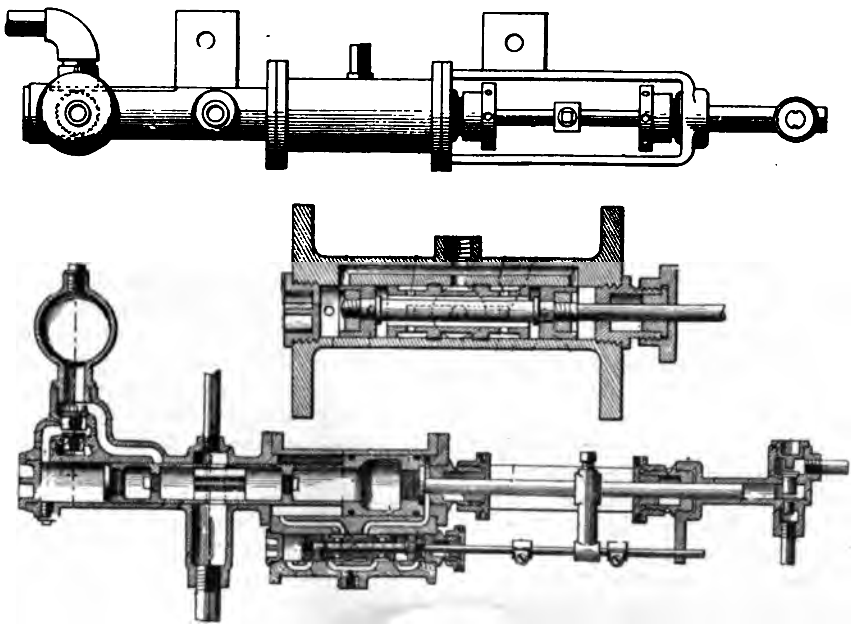
Relates to a steam carriage in which the engine (of the usual type) is placed in the rear part of the body, at one side, and is connected by a transverse jointed shaft to a gear shaft having bearings upon the reaches of the running gear and braced by distance pieces from the rear axle bearing. The rear axle is driven directly through spur gears.

712,267. Boiler Feeder.—Irving S. Davis, of Scranton, Pa. October 28, 1902. Filed November 2, 1901.

The boiler feeder comprises a casing and a steam operated plunger therein, said plunger having a water pocket into which the water is forced by the plunger itself through suitable valve controlled passageways, and the water pocket containing the charge of water is carried by the plunger into register with ports in the side of the casing, one of which is connected to the steam space in the boiler, the other being connected to the boiler at or below the normal water level, whereby the water is permitted to pass by gravity into the boiler until the latter becomes filled to the level of the plunger, which is arranged at the normal waer level of the boiler. When this level is reached the movement of the plunger slows down, and thereafter its activity will be in accordance with the rapidity with which the water in the boiler is evaporated. The steam consumed in operating the plunger will therefore be in accordance with the demands made upon the boiler, a rapid evaporation of water causing an active movement of the plunger, and vice versa. The plunger is operated by a steam piston arranged within a cylinder, and provision is made for preventing the complete stoppage of the plunger and piston by relieving the excess of pressure on the latter when the water in the boiler is at its normal level, thereby preserving the efficiency of the feeder as a regulator of the water level and avoiding an accumulation of condensed water in the cylinder, which would interfere with the action of the piston. The arrangement is such that the water pressure in the feeder exceeds the steam pressure in the boiler, and the leakage, if any, which may occur will always be from the feeder to the boiler and not from the boiler to the feeder, and therefore steam cannot escape from the boiler through the feeder. For this reason and on account of the peculiar construction stuffing boxes are not required around the plunger.

The arrangement of valves and ports for controlling the admission and exhaust of steam from the steam cylinder differs from those in ordinary use on steam pumps, and the rod which carries the tappet arm for giving the initial movement to the auxiliary valve also serves as the plunger of an air or liquid fuel pump, the cylinder of which serves as a guide for the outer end of said rod. The several parts are combined in one self contained structure particularly adapted for use in conection with boilers of motor vehicles.

In the drawing the steam cylinder is shown on the right and the water cylinder, of smaller diameter, on the left. The water arrives through a pipe at the outer end of the water cylinder, is forced through a valve into a dome on the return stroke of the plunger, and at the end of that stroke enters the chamber in the plunger through the ports in the walls of the plunger and of the cylinder. On the next forward stroke the water contained in the plunger is carried along, and when the ports in the plunger register with the ports in the cylinder wall in communication with the boiler, if the water level in the boiler is below the pump cylinder the water plunger will flow into the boiler.

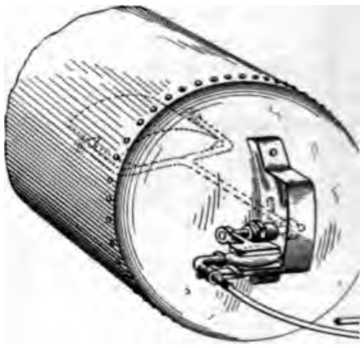


713,533. Motor Cycle.—Frederic[k] rot, of New York, N. Y. Noven[ber] 1902. Filed August 22, 1902.

The engine is mounted in the part of the diamond frame, the cylin[der] tending forward and upward at an about 45 degrees. It is chain gear[ed] intermediate shaft located just bac[k] seat post tube, about half way up. this shaft is a sleeve which can be ed to it by means of a friction clutc[h] sleeve carries a sprocket pinion, chain runs over this pinion a sprocket on the rear wheel.

713,847. Quantity Indicating D[evice] James H. Bullard, of Springfield November 18, 1902. Filed Noven[ber] 1901.

A float is located in the reservoi[r] tank) and provided with an arm e[xtending]



through a slot in the reservoir an[d] hollow metal boss secured to the r[eservoir] through the wall of which there e[xtends a] short rotable shaft, on the inner [end of] which the float arm is secured an[d to the] outer end of which is secured an [arm hav]ing a broad flat end thereon. S[aid boss] is provided with a stuffing box.

Outside the boss is fastened t[he] horizontal shaft on which a small [flexi]ble and compressible bag is locat[ed. The] compressible bag is in commu[nication] with a gauge glass graduated to [gal]lons. The compressible bag is [of] rubber and the tubular connection to the gauge glass is filled with a liquid. By means of the float short arm on the outside of the bag will, as the float rises, be com[pressed,] thus forcing the liquid therein out the flexible connection and into th[e] glass, the proportions of the devi[ce] such that when the float is at th[e] the tank the column of liquid will t[he] top of the gauge glass, and as t[he] falls, relieving said bag from pres[sure,] re-expansion of the bag permits umn of liquid in the gauge glass down proportionately to the fallin[g] ment of the float in the reservoi[r] clear that by this construction it is to locate the gauge glass whereve[r]

convenient to do so, regardless of ion relative to the tank.

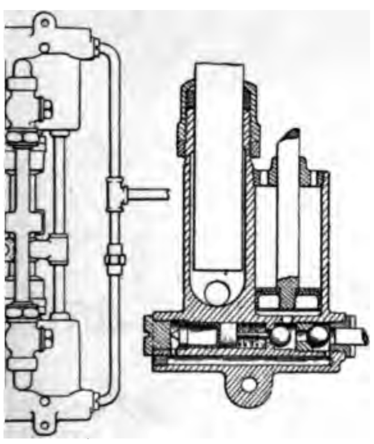
3. Air Compressing Device.—H. Bullard, of Springfield, Mass. er 18, 1902. Filed November 25,

ıvention aims to provide means in uously running air pump to render on of the piston ineffective when ısure in the receiver has attained ı value.

:omplete pump comprises two air ısion cylinders, oppositely arand two water cylinders below the nders. The two air compressor and the two water pump pistons h mounted on a common piston he two rods are connected by a d are operated by means of a conrod from a crank pin driven by ars from the rear axle.

ch end of the pump there is cast inwith the cylinders a vertical cylin-:asing, which is bored out axially vided with seats for two ball check

:el with the centrally bored out of the cylindrical casing there is ›assage extending from one end to :r of the casing, and at each end of passage there is a port leading into :ral bored out portion of the casing. the chamber in the cylindrical caslow the lower ball check valve, is a plunger, having a stem thereon



No. 713,848.

ng upwardly approximately to the ıide of the lower ball check valve. n the top of this plunger and the of the shoulder formed by the seat ball there is a spiral spring which ly holds the plunger down against › of an inverted expansible sack, open end is secured near the lower the chamber by a ring expanded : the wall of the chamber. Now the back pressure on the eduction ιceeds the resistance of the spring ınger will be raised and the lower eck valve held open. The result of eration will be that the air drawn in h the induction port will on the · stroke of the piston pass out again h the same port.

712,929. Valve for Internal Combustion Engines.—Carl O. Hedstrom, of Portland, Conn. November 4, 1902. Filed October 28, 1901.

The special feature is a joint for the intake valve case with the engine.

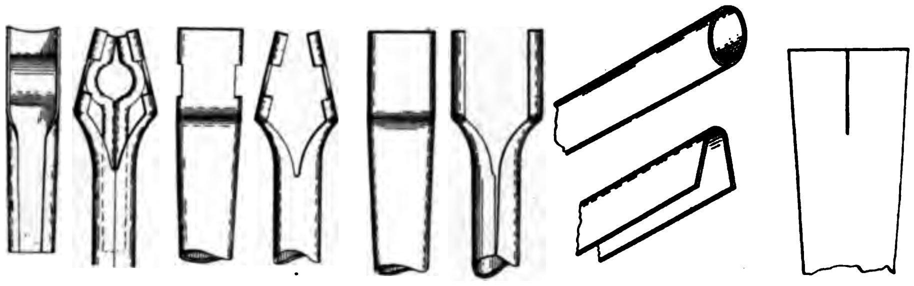
On top of the valve chamber of the engine is a neck which is provided with an internal annular flange and with opposite internal lugs. In the upper surface of the flange are drilled a considerable number of shallow holes, in a circle concentric with the flange. The valve seat is screwed into the valve case and is provided with an external flange from the under side of which projects a pin which may engage with any one of the small drill holes referred to. The valve case is also provided with external opposite lugs corresponding to the internal lugs of the neck on the valve chamber.

The valve seat is screw threaded into the valve case, and the adjustment of the seat relative to the case is such that when the latter is passed into the neck the pin entering one of the holes holds the seat stationary. Then the turning of the valve case to bring the lugs opposite each other and to bring the pipe connection into proper alignment with the connection leading to the carburetor will impart to the valve case a spirally vertical movement on the screw threads of the valve seat, whereby when the lugs on the case arrive under the lugs in the neck the latter will bind tightly against the former, and this pressure, downwardly acting, will hold in close contact the ground surfaces of the bushing and the annular flange in the neck, making a tight joint between them through which no gas can escape at the moment of the explosion of the charge in the cylinder.

712,995. Process of Peroxidizing Storage Battery Plates.—Rufus N. Chamberlain, of Depew, N. Y. November 4, 1902. Filed August 23, 1900.

It has been proposed to use in peroxidizing lead plates a solution containing sulphuric acid, to which is added a certain proportion of alkaline nitrates, resulting in a bath containing sulphuric acid, with a small percentage of nitric acid. This process has the disadvantage of leaving a certain amount of soluble alkaline sulphates in the bath, which may lead to injurious secondary reactions. It has also been proposed to add a small proportion of nitric acid direct to the bath; but in this case the disadvantage exists that the nitric acid not being set free in a nascent state in the bath is not as energetic as it would be if it were nascent.

The object of the present invention is to present the nitric acid to the plate in a more effective manner and to this end there is added to the sulphuric acid solution a suitable proportion of nitrate of a metal whose sulphate is substantially insoluble in the bath produced—for example, nitrate of lead. As a result, the sulphate is immediately removed from the bath, and the reaction proceeds in the most efficient manner without secondary reactions. The nitric acid is liberated whether wholly by the direct chemical action or partly by such action and partly by electrolytic effect in a nascent state in the bath itself, and its peroxidizing effect is correspondingly increased. I may and prefer to use for the supply of nitrate of lead the by product of a previous stage of the plate treating process—namely, the nitrate of lead solution resulting from the pickling operation. In case the nitrate of lead solution so produced is not strong enough to use directly it may be made sufficiently strong either by concentration or by addition of lead or of solid lead nitrate. The precipitate also from the peroxidizing bath—namely, lead sulphate—may be recovered and utilized, for example, by reduction or fusion into metallic lead for grids or otherwise.



No. 713,786.

713,786. Metallic Vehicle Wheel.—Thomas Midgeley, of Columbus, Ohio. November 18, 1902. Filed September 2, 1902.

A spoke blank of a length equal to the length of the spoke, and having tapering sides for forming a tapering spoke, is provided with a longitudinal incision which extends far enough up the blank to leave a wedge shaped opening in the blank and spoke. The blank is cut out of rolled sheet steel and placed in a suitable die, in which it receives its initial bend and assumes a U shaped form, and is then placed in another die and the side seam approximately closed and the blank bent into elliptic form. The large end of the blank is then placed in a suitable die and opened to form straight and parallel sides, their lateral flanges and wedge shaped opening on each side of the spoke blank between and above the sides. The same end of the blank is then placed in another die and the sides bent inward and notches or recesses cut

out in the flanges. The blank has now assumed the shape of a spoke and is ready to receive the reinforce, which is stamped into form in a suitable die, is in two parts, each part having a neck which extends up into the tubular body of the spoke, and a head in which is a transverse depression to form an opening through the reinforce for a bolt to assemble the spokes in a suitable hub. On the edges of the adjacent faces of the reinforce are laterally extending flanges to stiffen the reinforce and form a bearing or seat on the inside of the spoke to join the reinforce to the spoke by molten metal in a suitable brazing bath.

713,020. Process of Manufacturing Elements for Storage Batteries.—Elmer A. Sperry, of Cleveland, Ohio. November 4, 1902. Filed February 20, 1902.

To carry out this process, spongy or finely divided lead is first obtained in a dry state as free as possible from superficial oxidation or association with any foreign materials, such as the sulphates, acetates and like compounds of lead. The spongy lead may be produced from reguline lead or any of the well known oxides of lead, lead slag, or lead scrap by reduction. To produce spongy lead by reduction, metallic lead or an oxide of lead is immersed in a suitable electrolyte, whereby upon the passage of current between electrodes the spongy lead will be deposited upon the cathode. The spongy lead upon its removal from the electrolyte is first washed in a bath that is slightly acidulated by sulphuric acid, after which it is again thoroughly washed in water having a decided but not strong alkaline reaction, and finally is washed in pure water. The spongy lead is both washed and dried quickly by means of a rotary centrifugal machine running at a high velocity and is then spread in ovens or kept at a low temperature in thin layers until the remaining moisture is removed. Said lead is then ground or pulverized and is commingled with one or more of the oxides of lead and the salt of an alkali metal, such as the sulphates or phosphates of potassium or ammonia in the proper proportions. The mass is then moistened with an alkaline hydroxide and is thoroughly mixed or stirred until it becomes of a "mealy" consistency—that is, moist, but not wet—in which form it is quickly placed upon the grid, plate or support of the battery element and is then subjected to heavy pressure. The plates are "formed" by the action of an electric current in a suitable bath, after which they are grouped and charged in the usual manner to render them ready for use.

In making up the compound above described the proportions of sponge lead and of the oxide or oxides of lead may be greatly varied. The amount of the salt or salts employed also varies, as it is generally determined by the relative amount of the oxide or the oxides present, being usually only a small percentage.

A very serviceable battery plate or element may be produced by the use of from 60 to 70 per cent. of spongy or finely divided lead, from 30 to 34 per cent. of the oxide or oxides of lead, and from 4 to 8 per cent. of one of the alkaline salts.

Heretofore in the manufacture of battery plates or elements the materials comprising the active material have usually been mixed together while in a wet or moist condition. This prevents a complete and homogeneous mixture, as the particles of each ingredient tend to adhere together, so that the active material is "streaky," instead of being uniform throughout. Furthermore, when the ingredients are mixed while wet the spongy lead returns to its original or reguline condition when it is compressed, thereby seriously impairing the efficiency of the battery plate or element. According to this process the ingredients forming the active material are mixed or commingled together when thoroughly dry, so that a more intimate mixture is obtained than is otherwise possible, and the distribution of each ingredient throughout the mass of active material is absolutely uniform. The quality of the spongy lead is also maintained, as there is no tendency for this spongy lead to return to its original condition if it is mixed with the other ingredients when it is dry.

712,555. Roller Bearing.—Joseph A. Layland, Boston, Mass. November 4, 1902. Filed February 12, 1902.

713,849. Vapor Burner.—James H. Bullard, of Springfield, Mass. November 18, 1902. Filed November 25, 1901.

The mixing tube extending into the burner from the side is bent double and passes below the burner to the opposite side, which is claimed to project the flame further from the burner with the same fuel pressure and to prevent the burner from being choked with soot.

713,536. Exhaust Pipe Muffler for Gas or Other Engines.—John L. Tobias, of Chicago, Ill. November 11, 1902. Filed October 11, 1901.

713,462. Steam Boiler.—Leonidas Lewicki, of Dresden, Germany. November 11, 1902. Filed April 25, 1902.

713,186. Secondary Battery.—Robert Welford, of Sunderland, England. November 11, 1902. Filed November 21, 1899.

713,855. Pneumatic Tire.—George H. Clark, Boston, Mass. November 18, 1902. Filed October 25, 1899.

713,793. Explosive Engine.—John A. Ostenberg, San José, Cal. November 18, 1902. Filed January 21, 1901.

714,019. Axle.—Lars G. Nilson, New York, N. Y. November 18, 1902. Filed May 14, 1902.

714,049. Sparker for Gas Engines.—Louis B. Smyser, Newark, N. J. November 18, 1902. Filed January 29, 1900.

713,568. Non-Active Metal for Use in Storage Batteries.—Henry H. Lloyd, Germantown, Pa. November 11, 1902. Filed June 29, 1900.

Both Sides Heard From.

At a recent meeting of the Collingham Farmers' Club, in England, one member excused his late arrival by saying that he did not possess an automobile and was therefore dependent upon the exigencies of a rather uncertain service. Another member, who turned up at the dinner a few minutes later, caused some amusement, in view of the explanation of his predecessor, by saying that his belated appearance was owing to the fact that he had traveled in a motor car which had broken down.

The Columbus (Ohio) Buggy Company are erecting a new $40,000 building for the manufacture of electric automobiles.

Henry Wildmeier, a farmer of Carver County, Minn., is reported to have invented a motor tractor for agricultural purposes.

The Suitz Motor Carriage Company, Grand Rapids, Mich., will exhibit at the Madison Square Garden Show a two cylinder, two cycle, 16 horse power tonneau with bevel gear flexible shaft drive.

The Austin Automobile Company, Grand Rapids, Mich., will build a two cylinder tonneau and will also sell transmissions and motors separate. They have moved into their new factory on Division street, near Oak.

The Sandusky Automobile Company, a Delaware corporation, was qualified to do business in Ohio. It will locate at Sandusky, where J. J. Hinde will represent it. It has $100,000 capital stock. Hinde is president, F. T. Frantz is secretary and Charles H. Ely, treasurer.

Wheels and Tires

Issue of JUNE 26, 1901.

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agle Rock Hill Climbing Contest.

:h the hill climbing capacity of es has greatly increased during :w years, this factor still remains :erable concern to many pur- :specially those living in a hilly It would seem, then, that hill contests might interest the auto- ırchasing public, as they demon- : hill climbing capacity of the :hicles which the public is inter- now. But to properly serve their purpose such events must be so regulated that only stock vehicles can be entered and that they must compete in regular touring condition. If such rules are not enforced, and if specially built and stripped vehicles are admitted, a development of these contests may be expected similar to that of races—freak machines will take the lead and practical interest will dwindle.

In the Eagle Rock Hill climbing contest there were no rules restricting entry to stock vehicles or specifying the condition of vehicles when competing. There were no freak machines in the contest, but most of the vehicles had been lightened by taking off various parts, and in some the air resistance had been diminished by removing the dash. Some of the machines appeared in their regular running condition, however, and it is of interest to note that among these was the one which made the best time up the hill.

Another point which it is well to call attention to is that if the contest is to be of any practical value to a larger circle of automobilists the organizers should give out beforehand an accurate statement of the length and the grades at various parts of the hill. Interested spectators at the steepest part of the Eagle Rock Hill variously estimated the gradient at that part from 5 to 35 per cent. Almost equally wild figures have been published in some of the automobile publications, one, for instance, giving the maximum grade at 18½ per cent. and the average at 14½ per cent., whereas it will be seen from the map and profile published in this issue that the average grade is only little more than one-half the latter figure.

Like most of the smaller contests which have been held, the Eagle Rock Hill climbing contest suffered from a lack of effective management. To neglect obtaining a permit from the authorities seems almost inexcusable, and the start was fixed at too early an hour considering the locality. Spectators along the route were not numerous, but the tedious wait of nearly two and one-half hours from the announced starting time to the actual starting time was not calculated to promote future interest in automobile contests.

It must be said, however, that after the contest had actually begun everything worked comparatively smoothly.

Contest of "Teams."

At a recent discussion before the Automobile Manufacturers' Association of France regarding modifications in the racing rules, particularly for the proposed Paris-Madrid race, a number of suggestions were made by the Marquis de Dion which are intended to render this contest of more practical value. The suggestions are based upon the assumption that in long distance races chance or luck plays too great a factor, and are designed to partially eliminate this factor. It is proposed that each manufacturer shall enter a "team" (equipe) of a certain specified number of vehicles and that in making awards the total or average performance of the vehicles of each team be made the basis. Another innovation suggested is that the performance of vehicles which do not finish shall be counted in the total, according to a certain system of penalization for the distance not covered.

These suggestions are worthy of mention for the reason that they imply dissatisfaction with the present system of pure speed contests among leading manufacturers abroad. The aim to eliminate the factor of chance or luck is certainly to be approved, but we doubt whether the suggestions will be accepted by the French Manufacturers' Association and by the Automobile Club. The number of vehicles suggested for each team is five, although this point is left open for discussion. Now it is easily seen that the smaller manufacturers would not be able to bear the expense of such a large racing equip-

[illegible]

A Transcontinental Highway

[illegible] maintained by the central government chiefly on account of their value for military operations. It is evident that a transcontinental highway in this country would be of considerable strategic value, and as the construction of military roads naturally devolves upon the National Government this reason may lead to the appropriation

The Basis of Awards in the New York-Boston Contest

[illegible] the average [illegible] the table of official re- [illegible] of November [illegible] average speed [illegible] the maximum [illegible] The same [illegible] of these vehi- [illegible] penalized stops. Hence [illegible] are credited [illegible] a perfect speed record had penalized stops. Thus, in the case of these twenty- [illegible] vehicles, "a perfect record as far as [illegible] for a first class certificate was [illegible]" was not spoiled by penalized stops.

It developed in an interview with Secre- [illegible] Butler, of the Automobile Club, that,

[illegible] reliability contest.

Club Activity During the W[illegible] Months.

The [illegible] automobile events [illegible] have come to a close and [illegible] the next four or five months the [illegible] the automobile clubs will cer[illegible] meetings at the club houses, discu[illegible] The aims of most [illegible] clubs are chiefly of a social charac[illegible] the interest in automobile club life is [illegible] as seen during the [illegible] summer. Illustrated l[illegible] have become a much appr[illegible] feature with some of the leading cl[illegible] one which ought to become popul[illegible] automobile clubs generally. They [illegible] the automobilists acquainted with [illegible] conditions, roads, etc., in various p[illegible] the country and stimulate interest i[illegible] touring. As was well state[illegible] recent lecturer at the A. C. A., this [illegible] is rich in beautiful scenery and i[illegible] necessary to make a trip to [illegible] enjoy Nature, a fact which has n[illegible] fully appreciated so far, but whi[illegible] been emphasized by many of the l[illegible] on automobile tours which have bee[illegible]

Some of the clubs also have occ[illegible] lectures on practical subjects co[illegible] with automobiling, describing t[illegible] rangements and troubles liable t[illegible] with various parts of the mechani[illegible] symptoms of various troubles a[illegible] remedies. These lectures are ca[illegible]

ove the competence of operators, therefore also of much value.

r, the winter program of most of os includes banquets, receptions al gatherings.

d Weather Experiences.

s season of the year the most in- ; and instructive class of reading or the automobilist is the experi- those who make use of their ma- ie whole year round, regardless of d weather. Perhaps the majority persistent users are physicians. iny of whom we shall hear in our ' Number of January 7; but, no others will find occasion to try tomobiles when the thermometer v the freezing point, and in so iay encounter difficulties peculiar temperature. The story of such ices is appropriate at the present id we extend a general invitation readers to contribute to our col- i this neglected phase of automo- erience. Automobiles must and ised the year round, even in cold , but there are certain kinks and ons to be learned and certain im- nts in construction to be made his is possible. Your experiences terially aid in this improvement.

Our Doctors' Number.

st in our forthcoming Doctors' is developing beyond our most : expectations. Up to date no ı forty-five users have offered con- is and a considerable number of uscripts are already in our hands. icles will contain the essence of is of miles of road experience in irt of the country, and the number the most comprehensive publica- the road use of automobiles that n issued so far. It will be illus- ith both half tones and line cuts.

the number will be of much in- experienced automobilists, it will cularly valuable to intending own- m it will offer a chance to profit experience of others in the selec- ı car. It is to be pointed out that contributions are from private o they will be entirely unbiased. ie will go to many who are just ig to take an interest in automo- d orders for it are coming in con- Its interest and value will not ed to physicians, although it is particularly intended for them and the contributions will all be from medical men. It is evident that in the use of an automobile in a medical practice many of the same questions arise and conditions exist as in other uses of automobiles, and the doctors' accounts of their automobile experience will therefore be equally interesting to other users and prospective users.

The Sources of Noise in Gasoline Vehicles.

By Albert L. Clough.

Although the squeamishness of the general public in regard to the noise made by motor vehicles is rapidly lessening, as it is becoming more generally realized that the sounds made by these conveyances are unusual rather than actually of large volume, it is still of importance that the sounds emitted by these vehicles when in operation should be minimized in the interests of a general reduction in the noises of traffic.

There is a widespread movement toward a lessening of street noises of all kinds, and, while the iron tired delivery wagon and the ice cart are infinitely worse offenders than the automobile can ever become, it still behooves the motor car industry to carefully analyze the sources of noise, with a view to their elimination.

It will certainly be a strange case of "turning of the tables," but it is confidently believed that the motor vehicle will very soon be preferred on account of its noiselessness upon all paved and asphalted streets. The noise of the beat of the iron shod hoofs of horses upon these thoroughfares cannot well be eliminated, and where the road surface is slippery this is a source of a far greater volume of distressing sound vibrations than would arise from the operation of even a greater number of American built gasoline cars. It must be a matter of common experience that the "hoof noise" under these conditions is far greater than the noise arising from the motive power of gasoline vehicles suitably muffled and traveling at an equal speed. The impossibility of removing the "hoof noise" is the hard fact which must in the end make the motor vehicle preferred on the ground of noiselessness. Centuries of training have taught mankind to ignore this noise of hoofs which is so large a factor in the "roar" of great cities, but if one consciously wills his ears and brain to take account of it, he realizes at once the large part it plays in the nervous strain which is constantly imposed upon the dwellers in busy communities. The city of the future will not possess a "roar," but rather a mild hiss or rustle, and this will be brought about by the construction of better pavements, the suppression of hoof noises, and the universal use of the resilient tire, and the improvement, with all it implies in the direction of improved nervous condition among the people, will have to be attributed to the general advent of the motor car.

The sources of noise in a gasoline car may be placed under three heads:

(1) Engine noises.
(2) Transmission gear noises.
(3) Running gear noises.

It may be said that the noises which are most distressing are of two kinds. Sounds which are irregular in their occurrence and sounds which evidence an excessive or unusual wear of a part.

This fact must become increasingly true as mechanical intelligence advances, for the former source of disturbance evidences some looseness or irregularity of operation upon the part of the mechanism, and the latter some fault in lubrication, some misproportion of parts or some failure to protect the mechanism from disturbing outside conditions.

ENGINE NOISES.

It is unquestionably true that the high speed motors are the noisy ones, and this is likely to continue to be the fact as long as the reciprocating principle is adhered to. All parts, such as valves, which strike other parts must do so at higher velocities, and such noises as are present are more frequently repeated. What the internal combustion turbine might accomplish, even at high speeds, and what effect it might have upon the noise problem are merely matters for conjecture.

It is well known that the exhaust sounds of gasoline engines can be minimized just as fully as desired. It is merely a question of how large a muffler one cares to adopt, or how much one is willing to sacrifice in power lost through back pressure, or both. Exhaust noises will in the end be reduced just as far as the public demands. After the speed insanity has run its course and millionaires find some newer means than a gasoline Gatling gun to advertise their august presence, mufflers may be expected to be generally and generously constructed, so as to strike a happy medium between the demands of sound reduction and the evils of exhaust throttling. In the ear of the motor "crank," exhaust noise, unless too sharp and penetrating, is not noise at all, but more related to a musical sound below the limits of audition. And in this view he is not without support from the text books, which define noise as sounds of irregular occurrence. A gasoline motor, igniting properly, makes an exhaust sound which is not noise. A motor missing explosions produces unqualified noise, abhorrent to our æsthetic as well as to our mechanical senses. When a motor is missing, the effect upon its driver is not far different from an attack of palpitation of the heart. Mankind has an innate love for the regular, and something inside us consciously or unconsciously beats time.

The noises of valves meeting their seats and that of the cams which operate them are of no small consequence. Exhaust valves have, as a rule, very powerful springs and they close with a noticeable

clatter. Inlet valves, although operated with much less powerful springs, produce at high engine speeds a considerable amount of noise. If both these valves could be closed, as well as opened, by "uniform accelleration" cams, so that their velocity upon meeting their seats would be zero much of this noise would be prevented. The noise of the air entering the carburetor and passing the ports produces in many engines an unpleasant hollow, wheezing noise; and some makers provide an air suction consisting of a multiplicity of small openings in some non-resonant material, such as rubber pipe, which constitutes an intake muffler. Many vehicles are, however, without this provision and operated with a distinct and unnecessary noise, due to the air suction.

The noise due to the reciprocating parts is difficult of elimination in an explosion motor, subject as it is to stresses of constantly changing sign. The slightest lost motion in the bearings of the connecting rod, either upon the crank pin or the wrist pin, is the source of a distressing knock whenever the piston changes from positive to negative work and the reverse. A flywheel, which is not keyed to its shaft with absolute rigidity becomes, in operation, the source of nerve racking thumps. These noises are immensely accentuated when the motor is doing full work at low speed, as the torque then becomes the large factor in the power produced. Insufficient flywheel capacity is also the cause of noise at low speed, especially when hard work is called for. The motor, which cannot be throttled and sparked so as to run very slowly when the carriage is standing, is unsuited to the end of noiseless operation. No doubt, incorrect spark timing is a prolific cause of unnecessary noise. Abnormally early ignition produces loud "thumps" and undue wear of the reciprocating parts, and no operator has the requisite judgment or watchfulness to properly regulate this matter manually. Some automatic device to time the spark is an essential requisite of the quiet running motor.

A moderate speed gasoline engine with properly closed valves, an intake muffler, with means to conveniently take up wear in all bearings, sufficient flywheel capacity and an automatic spark timer properly adjusted, ought to be a quiet running machine when at work and, if it has a proper throttle, ought to prove a nearly noiseless one when standing.

TRANSMISSION GEAR NOISES.

Vehicles employing spur or bevel gears for transmitting the power to the driving axle necessarily produce some noise therefrom. If all gears be fully encased and operated in an oil bath the noise from this cause may be sufficiently minimized in case the gears are perfectly meshed and correctly cut. In case, however, that there is any defect in their alignment, the slightest looseness in their bearings or the least opportunity for spring in the material forming the supports of their bearings the gears tend to push away from one another and are thrown out of correct pitch. The pure rolling friction between their teeth then becomes complicated with a sliding friction, the tooth outline is rapidly destroyed and the destructive action goes on increasing with the production of a horrible grinding which is most offensive, especially to the trained ear. The operation of bevel gears involves a powerful thrust, tending to throw the two shafts out of a perfectly rectangular relation, and unless the bearings be extremely rigid and well fitted, faulty mesh and excessive noise are the results.

When gears are not enclosed it is practically impossible to maintain their lubrication, they become filled with grit and the correct tooth outline is soon lost, after which quiet operation is not to be expected. Gears having insufficient width of face or those which operate at undue peripheral speeds wear rapidly, and the inevitable accompaniment of this deterioration is a very unpleasant grinding noise.

The choice of materials for gears which mesh with one another is an important matter, and it is a generally accepted belief that gears of unlike materials operate most quietly together. If the use of fibre or rawhide were permissible upon grounds of strength, much noise might be prevented. Such materials ought to be usable if sufficient width of face were allowed to compensate for the inferior strength of the material.

In so far as gears can be dispensed with in the ordinary operation of a motor car, the noise of its operation may be lessened. Vehicles which have a direct transmission from the engine shaft to the axle, when operating upon the usual running speed, are to be commended as far as noiselessness is concerned.

The clashing of the gears when a change of speed is being made in transmissions of the sliding pinion type may be entirely obviated if the gears are cut upon the proper system and not too fine a pitch chosen.

A chain drive ought to be nearly noiseless when new and in good condition, but as chains are never encased in present automobile practice, and as they are particularly vulnerable to grit and difficult of lubrication, they wear faster than any other part of an automobile. After the rivets have begun to wear and the tooth outline is deformed the chain stretches and no longer fits the sprockets. The block or roller ceases to fall into its place properly, but each block strikes its tooth and later snaps into its space. There are thus two separate noises for each link as it passes each sprocket—when it strikes the tooth and when it later snaps into place, and much noise is the result. Fortunately a chain drive is upon the market which embodies a more serviceable mechanical principle and in which wear is automatically taken care of, to a certain extent. Such a chain, when brou[...] general use, will conduce to mo[...] running.

RUNNING GEAR NOISES.

The rattle of the running gear [...] attachments is the least excusabl[...] the noises which an automobile i[...] of. A vehicle running upon pn[...] tires should make no noise fr[...] cause, but this is far from being t[...]

Distance rods are a prolific c[...] rattle. They are generally attache[...] frame and to the rear axle by pla[...] or bolts of unhardened material [...] through holes in the ends of th[...] Whenever the engine is propelling [...] hicle the rod is under compressi[...] whenever the axle or wheel brak[...] plied the distance rods are under [...] and in this way the bearings of [...] are alternately subjected to stresse[...] tend to develop looseness therei[...] constant action of the rear springs [...] vehicle passes over rough roads [...] continual presence of grit, ma[...] wear very rapid, and as no adjus[...] ever provided at these bearings t[...] come very noisy when the vehicle [...] over any but perfectly smooth roa[...]

Brake shoes are generally loose [...] when not in action, and the brake[...] ing mechanism contains a number [...] adjustable joints which develop lo[...] and rattle after continued use. [...] gears which develop loose joints n[...] ble of being taken up, contribute [...] noise, as do the creaking of sprin[...] upon one another and the rattle o[...] links when worn. Too many auto[...] have front springs so weak that th[...] entirely when a water bar is met [...] high speed, and sometimes the m[...] the body is sufficient to cause an [...] ence of parts of the steering or [...] gear. There is plenty of noise und[...] circumstances. A loose mud guard [...] unpleasantly evident to the ear.

A scrupulous attention to the d[...] bearing adjustability, lubrication a[...] tection of moving parts will in [...] give us a quiet running gasoline [...] if the signs of the times be read [...] is none too early for the manufact[...] bestir themselves in this regard.

Advice to the Man with [...] "Fever."

By Robin Damon.

I received a letter recently from [...] who wanted to buy a gasoline aut[...] that would carry four people. H[...] that he had tried a steamer, and [...] up. He wanted to know what [...] best carriage in the market at a n[...] price. I could not tell him, and I [...] believe anyone else can. Exa[...] does not reveal much, and personal [...] ences are not safe to follow, for w[...] man might use a certain make fo[...] without trouble, another may be [...] water all the time. It is not safe

ements made in catalogues, for ac- to them every automobile is per- nd agents of different machines same pleasing stories. So, how is nner to know what to do? A man automobile fever is worse than a of drink. He simply must have a that moves without a horse, and tious ones try to be "wise" when up their cash. With such a feel- naturally ask everybody using an bile they know, and also get cata- and make personal inspections. few weeks of such work the would chaser is generally rather dazed, it every person possessing a motor also possesses the idea that it is ever, no matter what the make, ower or vintage. With a few ex- the inquirer is pleased to learn tle trouble" has been experienced, those owning the most com- machines. An occasional owner that he has had a lot of trouble ild be glad to dispose of his car- a great reduction. We all know ect such statements have on the h the fever. He simply puts the r make of machine on his black though it may be one of the best. on. At the final moment an order for a carriage, and the days pass until the carriage arrives. On re- the automobile from the freight e new owner may or may not be nied by an expert—or at least a o knows the steering lever from axle. I was a pioneer in gasoline iles for this section, and when I t my first machine no one near ything about it. A husky machin- turned over the engine against pression because the directions did tion the release cock—and so on. led against heavy odds, for it took ime to get advice, and then I fre- did not know how to apply the ion. I figure that the first six took more out of my automobile next two years, because I did not nd how to humor the machine. rs who can have the advice of me- who thoroughly understand the can pick up a great amount of formation in a short time. Still, the knowledge it is possible to I'm much afraid there are times e amateur gets into a mess during ation.

IGNITION PUZZLES.

new owner of an automobile is a nan, and possesses some mechan- ity, as time goes on he will find y of the first bothers can be ob- or overcome, easily. With gaso- iages of the ordinary make, I sup- beginner has more trouble with rical apparatus than anything else. h the make and break is simple, as a capacity for putting up puz- ecially to those not familiar with the antics of electricity. I reckon that I had my share of trouble from this feature, for I had no guide to follow. Later I learned that at the first signs of disturbance a new battery should be installed, unless, of course, wires were broken. I have found that with a good spark the gasoline vapor would usually explode if given half a chance. It is not enough that a spark should show outside the points, for even though it may be pretty fat, when it is surrounded by the compressed gas it may be dwindled to nothing. Hence I put my faith in batteries to remedy such troubles. With the present price of batteries it does not pay to waste time hunting for things. I get a set for $1.25 that will last from one to three months. They give plenty of warning when they grow tired.

I have tried four different styles of mechanical generators of electricity, at a cost enough to supply me with bateries for perhaps fifty years. All worked nicely at first, but they followed the same road of getting out of order under constant use. Some were repaired at factories, and they would run a few times. I have now discarded all of them and returned to dry batteries, always carrying a fresh set to put into commission when the old ones get weak. I know that many of the 1902 carriages were fitted with mechanical generators, and many have had good luck, especially when new, yet I do not believe it would pay any owner whose carriage is not so supplied to invest in a machine, because the cost would buy many sets of batteries—probably enough to wear out the delicate apparatus.

DOUBTFUL IMPROVEMENTS.

My experience with mechanical generators has been duplicated in other ways when I have tried to improve upon the original machine. I have added many things advertised as being "perfect." The expense has been considerable, yet all were taken off, and now my carriages are exactly as they were built, with the exception of improvements designed by the builders. I have greater respect now for those makers than I had at first, for I can see that whatever they have designed has been the result of many experiments and much cost.

I should say that with the average automobile the owner is foolish to spend cash and time in trying to "improve" it, especially with the machinery. Every horseless carriage is the outcome of a great amount of thought and work, and as a rule I think the design is selected for some good reason, and although there may be things that seem full of faults, it is likely that they are as good as could be designed if the whole vehicle is considered.

I am aware that there is hardly an automobile for which ingenious inventors have not designed many improvements, but I now fight shy of such things. And I have also learned that even the 'prentice boys in machine shops can build better machines than the oldest makers. I also accept their advice and suggestions warily. And beginners should hesitate long before they intrust extensive repairs to mechanics who want to remodel things. If you buy an automobile have faith enough in it to accept what the experience of the builder has demonstrated as being the best for the design adopted. You may—and probably will—have troubles, but accept them as incidents unavoidably connected with your machine, which the efforts of mechanics unfamiliar with its construction will not prevent. A rule of this kind will save cost and some difficulty.

CAUTIOUS OPERATION.

Another point, I think, is not brought out prominently, and that is the necessity of favoring an automobile when possible—just as a horse is used. Rough roads demand slow speed, for heavy machines get sadly wrenched by pounding into hollows. When the shafts are out of alignment it means increased friction and less speed. No matter how strongly constructed a carriage may be, it cannot go at top speed over bad places in the roads without suffering. Even though records may not be smashed it is a good plan to run at moderate speed whenever the conditions are not of the best. No owner of a horse expects the animal to keep up top speed constantly, yet men running automobiles usually set the lever at the highest point and let her go, regardless of everything. That sort of handling makes the repair men smile, for soon the racked joints make trouble, even if there are no breaks. I have seen in New York stables big foreign automobiles yanked about the floor savagely by the "expert" operators. In turning they will go at fast speed, and then stop so suddenly the wheels slide. Backing and going ahead in that rough manner must be a great strain on gears and clutches, yet a class of automobilists consider it the proper thing, because it shows outsiders how quickly the machines can be handled. Beginners who try to follow such bad practices may perhaps smash things at first, but if they keep on they will get so they can also perform hair raising stunts before an awe stricken public. It doesn't pay to do such things, however. Careful handling of a carriage will do more to keep it in order than the most thorough inspection can insure. And on the point of inspection it seems there is a widespread delusion that if a machine is critically inspected in the stable it will surely run. Some do—and many, in fact—yet so many accidents are liable to happen on the road that no one can tell what the outcome of a trip may be. Still I advocate rigid work before starting, for such a course will eliminate one element of danger.

TIRES.

The tires are things no man can tell about. A new set may be ruined on one

trip, or the rubber may last a season. I have found that as a rule tires were useless after being in use a year. There are exceptions, due, perhaps, to luck. I had one tire that was used thirty months, and it lasted until actually worn through, so that the fabric finally exploded. I know of a carriage bought in 1898 that still has one of the original front tires in use, although now bound up with tape. It does not leak and has escaped punctures. Several new sets have been worn out on the other wheels. This shows that tires are not all alike, surely. Perhaps statistics of the makers are prepared on the work secured from tires similar to the couple I mention here. Certainly the figures would be appalling if founded on the average life of an ordinary tire. There is no escape from the tire cost that I can see, and there is no reliable data upon which to form figures that will give the average cost. It is understood that a tire should go at least 3,000 miles. Some may last such a distance, yet I cannot recollect that I have ever had any of that sort, except in the one instance I mention. I should say that from my experience the tires will not run 500 miles before they meet with disaster. They may not be worn out, but if a puncture is received and the carriage is run with the wind out of the tire it is sure to be rim cut, and that means throwing it into the junk pile.

The beginner must make up his mind to meet the tire cost, for the automobile is useless unless supplied with air tight tires, no matter what the expense may be.

REPAIRS.

The matter of repairs is one that doesn't bother the new owner much before he has bought a carriage. Afterward the subject generally becomes interesting, depending, of course, on the kind of a machine used and the service given. Anyway, there's certain to be something for the repair man to do pretty soon. I have tried places where the makers of my machines had "official" repair stations, and found that the mechanics had only been employed a few weeks, or months at most, and their ideas of adjustment were mighty crude. One time it took me three days to get an engine in running condition after an expert had taken it apart. I thought I knew the difficulty, but the mechanic said I was not capable of giving him information. Finally, after being delayed in the city three days, I managed to get enough power to run into the street, where I worked an hour or more, and then went off rejoicing that I had escaped from the 75 cents an hour man's clutches. The whole difficulty was in the time the explosion occurred. The machinist insisted that it should go at a certain point, while experience had taught me that it must be greatly advanced. If I had not had experience I do not know how the difficulty would ever have been remedied, for even the young man in charge of establishment could not suggest a by which the power might be increased. I find that there are very few mechanics who can work on an automobile any time and leave it in condition for instant use. They get things out of adjustment and either do not know how to get them right or do not care. And it is frightful to observe how recklessly they will work in taking the machinery apart, without regard to the painstaking care required to put the cog wheels and other machinery back in their proper order.

At first the new owner will believe that it is really necessary to take from five to twenty-five hours in making slight repairs, but experience will teach that the average mechanic does not know anything about an automobile, and therefore the larger part of the time will be spent in either experimenting or investigating. I know one machinist, who is greatly interested in all kinds of automobiles, and when he gets hold of one it has a thorough overhauling if the owner is not nigh to prevent.

I've known a new bolt to cost $10, and other repairs on a similar plan. In fact, the repairs and tires form the greatest cost in running an automobile. Gasoline and oil form but a small portion of the legitimate expenses. Perhaps I should add depreciation, for no other property loses value so quickly as an automobile, principally because the styles change so much.

If, after finding out all he can about automobiles, the man with the fever scorching through his veins finally invests his good cash in a machine he will have many pleasant times—and also other kind of times. Still, on the whole, I guess the former more than offset the latter, for when the machine does work right I do not know of anything more productive of pleasure than the sensation of guiding it over good roads. Therefore if any of the readers of THE HORSELESS AGE feel that life is not worth living without an automobile, I should advise them to buy one if they have the purchase price and think they can afford to keep it running.

Motor Power Formulae—Effect of Compression.

By L. BERGER.

In an article in THE HORSELESS AGE of August 15, 1900, it was shown by the writer that the energy of an explosion in a gasoline motor cylinder may be represented by the formula

$$P_w = \frac{P_0}{\gamma - 1} \times r^{\gamma - 1} \times v \times (K - 1) \times a\,b\,c\,d\,e\,f \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

in which P_0 is the atmospheric pressure, v the volume of charge drawn in by the piston and r the ratio of compression. If v_1 is the volume of the compression chamber we have

$$r = \frac{v + v_1}{v_1}.$$

ratio of increase of pressure by
n, and this ratio may be found
mperature attained during the

explosion. If T_0 is the absol
ture before explosion and T
temperature after explosion, th

$$K = \frac{T}{T_0},$$

provided there has been no mc
traction of the gas. If the g
diminished in volume in the rati

$$K = \frac{T}{T_0} \times \frac{v_0}{v_1}.$$

The above equation (1) ma
in the form

$$P_w = P_0\, v \times f\,(r) \times b\,c$$

so that

$$f\,(r) = \frac{r^{\gamma - 1}}{\gamma - 1} \times (K -$$

The factor a represents the p
the heat energy of an explosic
after the loss by the exhaust
this factor is supposed to be c
is in reality variable with the
The same applies to γ and K.
fore propose to determine the
of these variable factors an
value of $f\,(r)$, taking accoun
conditions of variation. This
us to determine the exact v
motor power P_w.

In any high speed motor,
volume of the compression ch
the displacement of a piston
compression ratio

$$r = \frac{v_1 + v}{v_1},$$

and the compression curve
Consequently, if P_1 is the pres
after compression, we have

$$P_1 = P_0 \left(\frac{v_1 + v}{v_1}\right)^{\gamma} = P$$

On explosion the pressure rise
as K is the ratio of pressure n
by the explosion we have

$$P_2 = K\ P_1.$$

The curve of the expansion of
also adiabatic and the exhaust

$$P^1_2 = P_2 \left(\frac{v_1}{v_1 + v_2}\right)^{\gamma^1}$$

since the gases expand from
volume v_2.

The positive part of the e
work diagram inclosed by t
curve γ^1 is represented by

$$\frac{P_2\, v_1}{\gamma^1 - 1}\left[1 - \left(\frac{v_1}{v_1 + v_2}\right)^{\gamma^1}\right.$$

and the negative part, corre
the compression, limited by t
curve γ, is represented by

$$\frac{P_1\, v_1}{\gamma - 1}\left[1 - \left(\frac{v_1}{v_1 + v}\right)^{\gamma}\right.$$

Now, if we substitute for
their values found above, we
expression for the power ac
sented by the diagram

$$T = P_0\, v_1\, (r)^{\gamma}\left(\frac{K}{\gamma^1 - 1}\left[1 - \left(\frac{}{v_1}\right.\right.\right.$$

$$- \frac{1}{\gamma - 1}\left[1 - \left(\frac{1}{r}\right)^{\gamma -}\right.$$

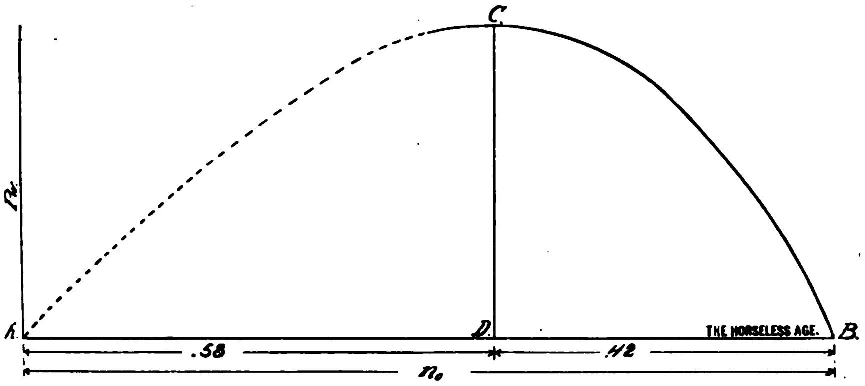


FIG. 1.—POWER-SPEED CURVE OF GASOLINE MOTOR.

We have now to determine the variation of K and γ with the compression.

In an article by the writer in the Kerosene Number the formula of reaction of combustion of a gasoline vapor mixture was shown to be

$$C_6H_{14} + 9.5\,O_2 + 36.1\,N_2 = 6\,CO_2 + 7\,H_2O + 36.1\,N_2.$$

If the combustible mixture is diluted with a proportion $\frac{1}{n}$ of burnt gases from the previous explosion, which fills the compression chamber at the end of the exhaust stroke, the reaction will be

$$C_6H_{14} + 9.5\,O_2 + 36.1\,N_2 + \frac{46.6}{n}$$
$$= \left(6 + \frac{5.7}{n}\right)CO_2 + \left(7 + \frac{6.45}{n}\right)H_2O + \left(36.1 + \frac{34.3}{n}\right)N_2$$

As the gases remaining in the cylinder and mixing with the new charge are of the same composition as the products of combustion of the new charge, the value $\frac{5.7}{n}$ of mixed CO_2 is equal to

$$\frac{46.6}{49.1} \times \frac{6}{n};$$

the value of $\frac{6.65}{n}$ of mixed H_2O is equal to

$$\frac{46.6}{49.1} \times \frac{7}{n};$$

the value $\frac{34.3}{n}$ of mixed N_2 is equal to

$$\frac{46.6}{49.1} \times \frac{36.1}{n}.$$

$\Sigma\, n\, a$ and $\Sigma\, n\, b$ have therefore the following values:

$$\Sigma\, n\, a = \left[\left(6 + \frac{5.7}{n}\right) + \left(7 + \frac{6.65}{n}\right)\right] 6.2 + \left(36.1 + \frac{34.3}{n}\right) 4.8$$

$$\tfrac{1}{2}\Sigma\, n\, b = \left[\left(6 + \frac{5.7}{n}\right) + \left(7 + \frac{6.65}{n}\right)\right] .0025 + \left(36.1 + \frac{34.3}{n}\right) .001$$

$$\text{or } \Sigma\, n\, a = 254 + \frac{241}{n} = 254 + \left(254 + \frac{.95}{n}\right)$$

$$\tfrac{1}{2}\Sigma\, n\, b = 0.7 + \frac{.0651}{n} = .07 + \left(.07 \times \frac{.95}{n}\right)$$

This leads to the equation

$$t^2\left(.07 + .07 \times \frac{.95}{n}\right) + t\left(254 + 254 \times \frac{.95}{n}\right) - 953{,}400 = 0,$$

which gives after reduction the following value for the temperature:

$$t^1 = -1814 \pm \sqrt{3{,}290{,}000 + \frac{13{,}620{,}000}{1 + \frac{.95}{n}}}$$

and if we neglect the value $3{,}290{,}000 \times \frac{0.95}{n}$ we have finally for the temperature t^1:

$$t^1 = 4112\sqrt{\frac{n}{n + .95}} - 1814$$

and for $\frac{P}{P_o} = K$ we have:

$$K = \frac{49.1 + 49.1 \times \frac{0.95}{n}}{46.6 + \frac{46.6}{n}} \times \frac{4112\sqrt{\frac{n}{n + .95}} - 1541}{273}$$

which reduced gives

$$K = \frac{n + .95}{.95\,n + .95} \times \left[15\sqrt{\frac{n}{n + .95}} - 5.64\right] \quad \ldots\ldots (b)$$

Recent researches have shown that for a mean temperature of expansion of 700° C. γ has the following values:

For H_2O, $\gamma^1 = 1.272$; for CO_2, $\gamma^1 = 1.210$, and for N_2, $\gamma = 1.398$. The mean value of γ for the burnt gases is consequently 1.35.

For the combustible mixture at 15° C., or air mixed with 2.15 per cent. of gasoline vapor, $\gamma^1 = 1.405$. For a mixture of one part of burnt gases and n parts of new combustible mixture we have therefore

$$\gamma = \frac{1.405\,n + 1.35}{n + 1} \quad \ldots\ldots (c)$$

These three equations—(a), (b) and (c)—enable us to determine the energy actually represented by a power diagram.

In a four cycle motor we have

$$\frac{v_1 + v}{v_1} = r;\ v = v_2;\ \frac{v_1}{v} = \frac{1}{n};\ v_1 = \frac{v}{r - 1};$$

v being the displacement of a piston stroke and consequently the volume of the new charge. Consequently we have for a four cycle motor—equation (b):

$$K = \frac{r - .05}{.95\,r}\left[15\sqrt{\frac{r - 1}{r - .05}} - 5.64\right];$$

equation (c):

$$\gamma = 1.405 - \frac{.055}{r};$$

equation (a):

$$T = \frac{P_o\, v\,(r)^{\gamma}}{r - 1}\left(\left[\frac{K}{0.35}\, 1 - \left(\frac{1}{r}\right)^{0.35}\right] - \frac{1}{\gamma - 1}\left[1 - \left(\frac{1}{r}\right)^{\gamma - 1}\right]\right)$$

and from these equations the value of $f(r)$ above may be found:

$$f(r) = \frac{r^{\gamma}}{r - 1}\left[\frac{K}{.35}\left[1 - \left(\frac{1}{2}\right)^{.35}\right] - \frac{1}{\gamma - 1}\left[1 - \left(\frac{1}{r}\right)^{\gamma - 1}\right]\right]$$

We may now substitute the value of $f(r)$ in equation (2). Writing this equation in the form

$$P_w = P_0\, v_1 \times f(r) \times b\,c\,d\,e\,f,$$

it holds for any cycle, v_1 being the volume of the compression chamber and $f(r)$ having the general value

$$f(r) = r^{\gamma}\left(\frac{K}{\gamma_1 - 1}\left[1 - \left(\frac{v_1}{v_1 + v_2}\right)^{\gamma^1 - 1}\right] - \frac{1}{\gamma - 1}\left[1 - \left(\frac{1}{r}\right)^{\gamma - 1}\right]\right),$$

the values of K and γ being to be determined by means of the equations (b) and (c) respectively; γ is the value for the burnt gases of gasoline ($\gamma = 1.35$) and v_2 being the volume of the expansion stroke.

(To be continued.)

Foreign Engraving Blocks.

We would advise our readers in foreign countries not to send any engraving blocks to our office for use in our reading columns. The tariff duty on these blocks is as much as it would cost to have them made here, and, besides, we find that very frequently these cuts are of such a nature that we cannot make use of them. That the cut has been published in some foreign automobile journal is no reason that it should be suitable for our columns. We are, of course, always glad to hear of practical novelties making their appearance abroad and are glad to accord space to a description of same in proportion to their merit, but it will be advisable for the interested parties in such cases to send photographs or blue prints, as the case may be, rather than cuts. If we think the matter of interest to our readers we will have the cuts made here, and the sender will save trouble and expense in either case.

The Orange River Colony Motor Bus Company, Limited, has been formed at Bloemfontein, South Africa, and starts with three cars of 6, 8 and 12 horse power respectively for service in Bloemfontein. Messrs. Winch & Co., of the same town, are also running several cars for the same purpose, and will shortly have two 20 horse power vehicles on the road.

BEGINNERS PAGE.

The Single Acting Engine.

Single acting steam engines for automobiles have been made in the following different forms: (1) Three cylinder, with the axes of the cylinder radial in a common plane; (2) three cylinder, with the cylinders parallel with each other, on the same side of the crank shaft; (3) four cylinder, with the cylinders parallel with each other, and their axes at the corners of a square at right angles to these axes; (4) four cylinder, with cylinders arranged oppositely two and two. The latter type has been employed most extensively, and will therefore be described here. In Fig. 1 is shown a side elevation partly in section, and in Fig 2 a plan, also half in section, of an engine of this type.

Referring to these two figures, A A A A are the four cylinders, which are cast in two pairs and bolted to the crank case C. B B are trunk pistons of the type used in explosive engines, provided with piston packing rings. These pistons are connected by connecting rods D D to a double throw crank shaft E, with the two cranks set at 90 degrees with each other. Each cylinder is provided with an admission valve F and an exhaust valve G, both of the poppet type. These valves are located

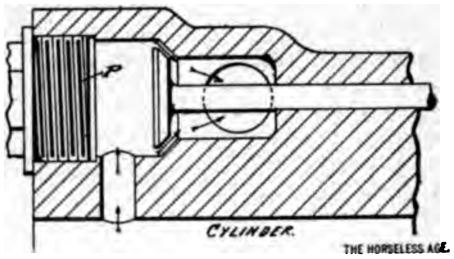


FIG. 3.

on top of the cylinder and at an angle therewith, as seen. The valves are held down to their seats normally by helical springs H H. They are lifted at the proper moment by means of a mechanism comprising the rock arm I with the adjusting screw J, the push rod K, the cam roller L, the cam M on the square cam shaft N. The latter is located directly above the crank shaft and is driven from the latter by a pair of equal spur gears O and P located outside the crank casing.

Since the two cranks are set at right angles with each other, when two of the pistons are at the end of their stroke the other two are at approximately half stroke. One of the latter two is forcing out the expanded steam and the other is being forced forward by the pressure of live steam; so that always at least one cylinder is developing power.

Into the top of the admission valve chamber is screwed a nipple R, through which the live steam arrives from the boiler. The space above the valve is therefore always filled with steam at boiler pressure. When the admission valve is lifted, by means of the valve operating mechanism as described, the live steam passes the valve and enters the cylinder behind the piston. Admission just before the piston reaches the dead centre. Both the lead of the admission and the cutoff can be varied, however, by shifting the variable cams, as will be explained further on.

THE EXHAUST VALVE.

Fig. 3 illustrates the manner in which the exhaust is disposed of. The chamber above the exhaust valve communicates with the cylinder through a passage. This chamber is closed by a plug P. When the valve is lifted from its seat by the mechanism the steam flows past it and from the chamber below the valve out through a passage running at a slant across the cylinder on top, the passages from the two exhaust valves of one pair of cylinders uniting, and then running down between the two cylinders, as shown at S, Fig. 1.

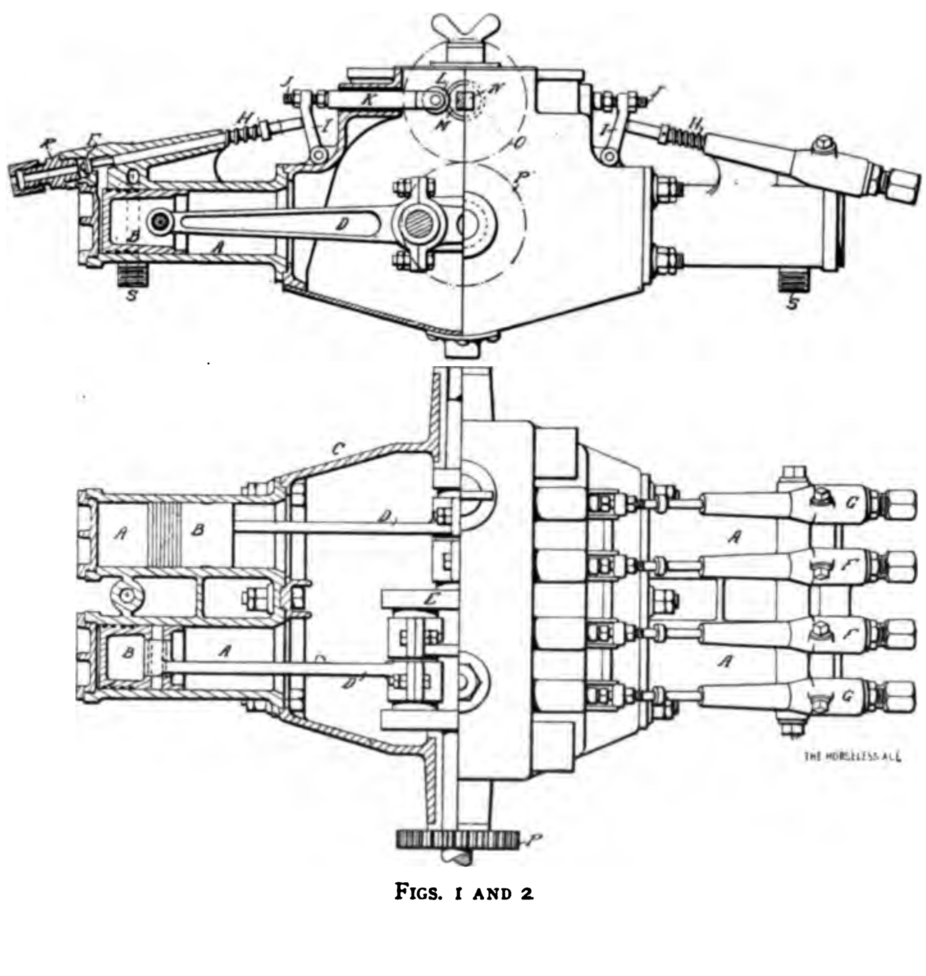
VARIABLE EXPANSION AND REVERSING GEAR.

The cam gear permits of any desired distribution of steam. The four functions of the valve gear—opening the admission valve, closing the admission valve, opening the exhaust valve and closing the exhaust valve—can be varied either independently or simultaneously, as desired, which is not possible with a gear in which both admission and exhaust are controlled by the same mechanism.

Referring to Fig. 4, A is the square cam shaft located on top of the engine, as already explained. This cam shaft slides in bushings B B' at its ends, which act as journals. To the bushing B is fastened the gear C through which the cam shaft is driven. Rigidly fastened upon the cam shaft are a considerable number of separate cams D D D. The cam shaft may be slid lengthwise in the bushings B B' by a mechanism not shown, and when thus moved the cams are of course similarly displaced.

In Fig. 5, A and B are the push rods for the admission valves of oppositely located cylinders. These push rods are located exactly in line with each other and are operated by the same cam. The cam roller on the left is shown on the high part of the cam, and the admission valve of the cylinder on the left is therefore full open. This means that the piston on the cylinder on the left is making the power stroke and is at about half stroke at the moment. But since the two opposite pistons are connected to the same crank, as shown in Fig. 2, it follows that the piston in the cylinder on the right is now making the exhaust stroke and is at the same point of the stroke as the opposite piston. As the cylinder on the right is exhausting, its admission valve should of course be closed, and this will be seen to be the case as the cam roller of push rod B, corresponding to this valve, is on the low part of the cam.

After a half revolution of the crank shaft and cam shaft the positions of the



FIGS. 1 AND 2

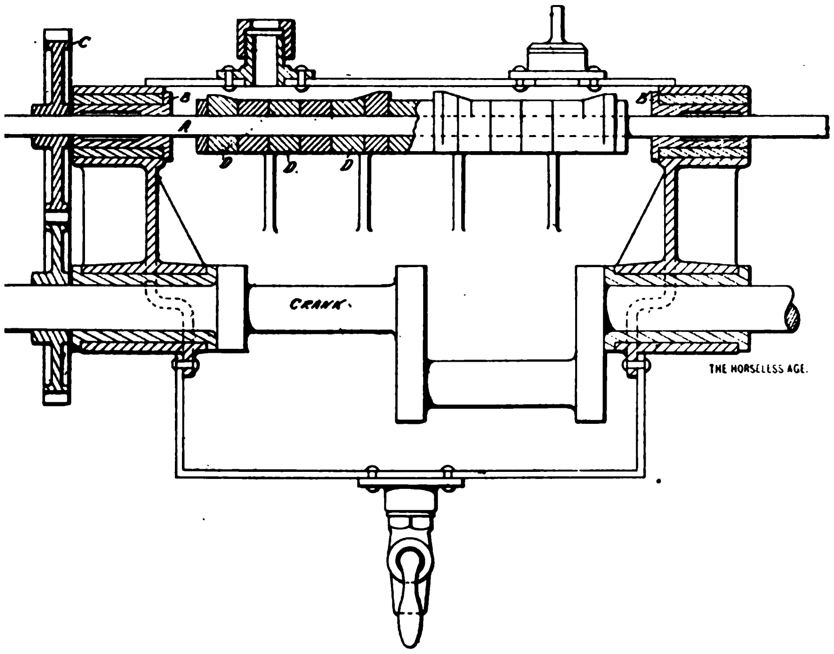


FIG. 4.

lves are reversed; that is, the valve : left will then be closed and the n the right opened. The cylinder on t is then exhausting and the one on ht receiving steam.

'ig. 5 the movable cam shaft and ire shown in one extreme position, it corresponding to forward motion speed. The opening of the valves ximum. It will be noticed that the of the cam is slanting; the height raised portion of the cam reduces maximum at one end to zero at the Consequently if the cam is shifted he rollers the lift of the valves will lually reduced, until when the roll- on the cylindrical portion C of the e valves are not lifted at all. .

e cam shaft is shifted still further, ersing cam F comes into action. a duplicate of the cam D for for- iotion, but is set just opposite the Now suppose the two opposite at half stroke, the one on the left ig steam and the one on the right ting, as would result from the cam n shown in Fig. 5. The two pis- ould then be moving in the direc- om left to right. If now the cam ıddenly moved from one extreme n to the other, the admission valve left would be closed and that on the right opened; consequently the functions of the two cylinders would be reversed and the pistons would begin to move from right to left, resulting in a reversal of the direction of crank shaft rotation.

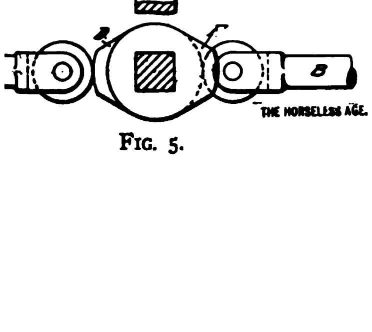


FIG. 5.

Double cams are, of course, also provided for the exhaust valves, and these are shifted simultaneously with the admission valve cams, being fastened to the same shaft.

All the main working parts, the connection rod bearings, cams, etc., are enclosed in the crank case, which has a sheet iron bottom and a removable door on top. A cock at the lowest part of the crank case permits of removing all oil from the case. The lubrication of this machine is on the splash system.

The advantage of the single acting engine over the double acting engine is that it avoids the use of piston rod and valve rod stuffing boxes, which are always of more or less bother, but particularly when highly superheated steam is used. On the other hand, owing to the greater number of cylinders required the single acting engine is more complicated than the double acting; for equal power it is heavier and bulkier.

Automobile Accident.

E. Harris Ashton and Evan Chipman were in an automobile accident on the North Delaware road, near St. Anthony's Nose, on November 23. Mr. Chipman, who was steering the machine, turned to the right to clear a wagon, when the machine skidded in the mud and came against the railing with great force, breaking the timber and going over the embankment. Messrs. Ashton and Chipman were thrown out, but escaped unhurt. The auto struck a tree in its descent and lodged there, preventing it from going into the river.

LESSONS OF THE ROAD

My Third Purchase.

BY HARRY B. HAINES.

I have once more joined the light weight gasoline runabout class, after having soared far above it into the 2,000 pound heavy weight touring car coterie, and am now the owner of a 4 horse power vehicle of standard make which, by its performances, has added materially to my automobile experiences.

When the auto fever first seized me I purchased a machine such as I am at present operating, and despite the fact that I was totally ignorant of automobiles and their mechanism I managed to push it along over 3,500 miles of city and country roads at a cost of not more than 10 cents a mile, which is not at all exorbitant, when it is considered that I boarded my machine at an auto station and paid for my repairs at the rather high rates then in vogue all over the country.

Although I am by no means a pioneer automobilist I had the distinction of being the owner of one of the first machines of the gasoline type brought to my city, and since that day a number of my friends, all would be enthusiasts, have been watching my experiences and expenses with an eye to saving money by letting me pay to find out the weak points before they themselves purchased any sort of a motor vehicle.

THE SECOND MACHINE.

My second machine was what is known as a tonneau touring car, a bright red one, pretty to look upon, which I embellished with a $50 brass headlight and numerous other articles, resulting in a bill for extras of something over $300.

It was a single cylinder car, which had been represented by the manufacturers to contain a 10 horse power engine, but when it was delivered to me and I had parted with my money I found that the cylinder was a 5x7 and could not be figured out as anything more than a 7 horse power engine and would only develop that power when speeded up to its limit. The machine had three speeds forward and a reverse, a self oiler and a make and break spark which nearly broke me buying batteries for it.

IGNITION EXPERIENCE.

One set of batteries at $4 a cell, costing $8 for the set, ran exactly 60 miles, when they both went flat at 110th street and Seventh avenue, New York, just as I was coming out of Central Park, and I was stalled for five hours before I could get a new set. In the three months I owned the machine I had six sets of batteries, which made the expense for that item alone over $48.

In my opinion the jump spark is much

superior to the make and break, and after the experience I have had I prefer it every time. The spark mechanism on my machine was rather peculiar, the entire plug being on the inside of the cylinder. The points had a fine adjustment which allowed a movement of just three-thirty-seconds of an inch, and it was no easy matter to make this adjustment on the road when it became necessary to remove the plug for any purpose. Another objectionable feature was a set of two lava washers which, when cracked, rendered the plug useless and put the carriage out of commission and which could not be put in without dissecting the whole spark mechanism.

LUBRICATION TROUBLES.

The self oiler on this particular machine was also another source of annoyance and expense. It was devised to act as a covering for the forward end of the crank case and was supposed, when filled, to last for 125 miles and keep all parts of the machine oiled automatically. There were five copper tubes running from the central storage well and each of these was fitted with a sight feed and the usual arrangement for regulating its flow. The top of the valves which controlled the oil flow were held in position by brasses which pressed against the round milled edges, and these invariably became sprung and allowed the valves to open to their fullest extent, letting all the oil rush through and fairly flooding the engine and choking the cylinder.

This oiler could not be depended upon for an hour at a time and caused me no end of trouble by fouling the spark plug points and, of course, causing a suspension of the explosions and a consequent stoppage of the engine and the machine. It was often necessary when held up on the road by this cause to remove the plug from the bottom of the cylinder and allow a quart or more of oil to run out of the crank case. With oil selling at $1 a gallon this was a rather expensive proceeding, apart from the delay and annoyance it caused.

Self oilers as a general thing are desirable additions to any machine, but they should be positive in their regulation and action and should be so constructed that their feed stops when the motor ceases working and begins again only when the motor starts. There would then be no valves to forget to close and no danger of flooding the machine with oil, which covers everything with dirt and grease as it is thrown around by the motion of the engine and the clutches.

It might be well to state that the type of machine I purchased proved troublesome, not only to me but to a number of other persons, who purchased them principally because they looked "just like a French car" and didn't cost half as much. I, no doubt, got all that I paid for and I was glad to part with my bargain after owning it three months for $300 less than I paid for it. I have given up looking for cheap machines, being firmly convinced that it is best to pay a fair price for a good article than to accept a poor one gratis.

It is not my intention to cast reflections on any manufacturers, but they are no more infallible than other mortals and are just as susceptible to making errors and mistakes, and I do not hesitate to say that any concern which designs a tonneau car weighing nearly 2,000 pounds without the passengers, and equips it with a slow speed 7 horse power horizontal motor, which is expected to take four persons of even medium weight touring over American roads, makes a mistake, and a very bad one at that.

During the last month that I owned my big car it was laid up in the local repair shop and six different experts from the factory worked on it, some a day, some a week, trying in vain to get a compression. A new piston and new rings were brought, but to no avail, and finally after they had all given it up the machine was stripped of all weight and towed down to the factory, where at last accounts it was still apart, the mystery as yet unsolved.

BUYS A LIGHT RUNABOUT.

It was while the carriage was at the factory that I sold it back to the agent from whom I had purchased it for just $300 less than the rig had cost me and accepted in part payment a light runabout.

Perhaps my greatest trouble with the touring car was with the bronze bearings on the crank pin, these invariably developing a serious knock after each day's run. The factory furnished four sets of new brasses without any better result, and finally announced that they had discovered that the man who sold them their boxes had been robbing them and they intended to install their own foundry and they would then send me a decent set of bearings. This admission, as surprising as it was, could not compare with the one made in a letter to me later, in which the secretary of the company stated that he regretted to learn that I had sold my machine, and then coolly announced that he thought my main troubles had been caused by poor and soft metal in the crank boxes and "a little poor workmanship put in the machine." Just how much poor workmanship a "little" is I am unprepared to say, but when manufacturers make such admissions as these it is no wonder that the purchaser sometimes feels a little dubious about what he is going to get for his money. The manufacturer's guarantee of sixty days against defective parts is all well enough for them, but if an automobile cannot be made which can be guaranteed against defective parts and workmanship as long as a common bicycle, there is something decidedly wrong in the system of turning out horseless vehicles.

WHAT IS WANTED IN A TOURING CAR.

It is an old adage that experience is a costly teacher, and after having paid over $300 to learn the fact I feel it my duty to state for the benefit of my fellow automobilists that, in my opinion, no machine having less than 12 actual horse power engine is sufficiently strong to be used as a touring car that is to carry four people. Less powerful engines will wheeze along with the load, but the strain on the machine is terrible, to say nothing of the strain on the owner's purse for the ever appearing repair bills.

My next touring car will have a motor of two cylinders at least, and possibly four, and will not be under 16 horse power nor over 20. A car of that description geared fairly low would be the ideal machine for long trips, for outside of the heaviest grades there would be no hills that were noticeable, and after all it is the ability to climb grades and negotiate bad roads that is essential and not the ability to break speed ordinances.

To revert to my present machine and to light weight machines in general, I firmly believe that the two passenger cars have the greatest future before them of any type. Anything over $1,000 is a prohibitive price for an automobile, and the great middle class who want machines hesitate a great while before deciding to span the difference between $800 and $1,000, despite the smallness of the leap.

My present machine complete, with top, lamps and storm curtains, cost about $800, and I have figured out that with good luck and a freedom from serious accidents I can operate it at an average cost of about $35 a month, of which sum $12 is paid for storage and cleaning.

CAUSE OF BEGINNERS' TROUBLES.

My previous experience has proven to be worth dollars and cents to me at every turn and I have come to realize the fact that half the troubles of beginners are caused by the fact that they become possessed of the idea that they are capable of running an automobile after their very first lesson in operation, and they insist on starting out with their wives, mothers or friends on a long trip without the slightest idea of the wiring, gasoline feed, transmission, or, in fact, any of the essential parts of their machines. Some small thing gets out of adjustment 20 miles from home and then the novice pays for his heedlessness when he finds himself stuck.

When in that unenviable position myself I have often thought of a little nursery rhyme, which I think applies to automobiles more aptly than anything else I know. It runs:

There was a little girl and she had a little curl
Right in the middle of her forehead,
And when she was good she was very, very good,
And when she was bad she was horrid.

It is the same with an auto, and every chauffeur will agree with me that there is nothing more pleasing than a motor that motes and nothing more cussed and disgusting than one that doesn't.

:UT-OFF ON MUFFLER.

tted my machine with a cut-off ffler, which I open when climb- r running in the country and s greatly to the power of the It is a very simple device, con- ι three-way Globe valve, which etween the explosion chamber ffler. The valve stem is turned front of the carriage and a long onnecting with it runs past the to the floor directly under the feet. By turning the valve opening the valve the explosion ing the explosion chamber into the open air with a loud the motor is relieved entirely k pressure. When the valve is explosion goes into the muffler y and the machine runs quietly.

RCHING FOR THE CAUSE.

norning of Thanksgiving Day, d by a friend, I started out for run to New Brunswick, N. J., . We started out bright and ıad gone a distance of about 5 of town when suddenly the mo- o skip spark and finally threat- p. I managed to keep it going lly for a few minutes and then n with a snort and the machine ly friend and I piled out and o locate the cause of the trou- er I had gone over all the bat- tions and found them to be in- ed him to cranking the motor pt to start it while I held down ession. We could get an ex- ce in a while, but the motor run steadily, and the moment s were thrown in it stopped.

t move made was to connect of batteries together, as I was nder the impression that we etting a good spark, despite the e plug gave every indication of l right when tested out of the chamber. This was done, but was the same, and I next dis- the gasoline pump, thinking tent leather suction might not right, as these pump leathers ss when they become cracked. pump to be working all right xt move was to disconnect the e controlling the gasoline feed her pipes connected with the pply. All these were found to ıd scarcely knowing what else ecured my collapsible bucket ıll the gasoline from the main ıg that there might be some e stuff. I filled the tank from r supply and started the motor it refused to go.

ıost at the end of my rope by aving been stalled for over two ı my friend suggested that per- ire connection on the commu- might not be good and per- ıld be a good thing to make it I got under the machine for this purpose and a moment later discovered the trouble in a place that I would never have thought to look for it.

THE COMMUTATOR SPRING

had become encrusted with dirt and oil and did not press against the rapidly revolving cam shaft and consequently the spark, instead of being regularly made, came only at intervals, and hence the irregular action of the motor. A few drops of gasoline washed the spring and the contact point on the shaft clean and the motor then started off without hesitation, and we were soon under way, our first difficulty overcome.

For 10 miles or more we sped along without a single hitch, and then, after coasting down a long hill I threw in the high speed clutch on a slight up grade and noticed that the motor immediately appeared to be choked and pounded as if overloaded. Despite the fact that I pressed down on the speed accelerator, which controls a gate valve admitting more gasoline to the motor, it did not pick up, and there was nothing to do but to stop. I walked around to the back of the machine and lifting the back board looked at the wire connection on the accelerator, and it appeared to be intact, and finding nothing else wrong I started up the motor, and climbing in started ahead, but the motor still refused to speed up. Again I got out and as my friend pressed his foot on the pedal controlling the gate valve I watched to see it move. The valve remained stationary and I knew that the

WIRE HAD BROKEN

near the front of the carriage. It was a short job to tie the accelerator down and we were soon under way again.

We reached our destination without further mishap, but on the return trip, when about $1\frac{1}{2}$ mile from home, were suddenly stalled by the motor stopping. For two steady hours we worked, doing everything imaginable, but we were unable to make the motor start, and finally we decided to be

TOWED IN,

and telephoned to the repair station, with the result that in a short time a steam carriage puffed up and threw us a rope.

When we had been finally landed at the repair shop I decided to find out what had been the cause of our latest hold up. I tested my batteries and found them to be all right, and then gave my attention to the gasoline feed supply, and it was in this department that the whole trouble lay. There is in my machine a small conical shaped copper wire strainer through which all the gasoline passes before reaching the explosion chamber. This is soldered in position and the

SOLDER HAD GIVEN WAY,

allowing the strainer to fall down. It had dropped in such a position that it was impossible for any gasoline to get past it and the motor had properly enough refused to go without its accustomed feed. A new strainer was soldered into place and then when the gasoline pipes had been connected again the motor started off and ran like a charm.

A CHEWING GUM EPISODE.

There was one rather peculiar incident on this trip which is well worth mentioning and which might aptly be termed a chewing gum episode. While driving my machine toward Elizabeth the front tire suddenly collapsed and when we got out to investigate I found that a large nail had punctured it, driving clean through the tire and puncturing it about half an inch above the rim on both sides. We secured a fence rail and two large stones, and by means of these jacked up the wheel so that we could inspect the damage done.

I had tire tape and a pump with me, and with these tools I started in to fix the cut. I wound the tire tape around the wheel and pumped the tire up, but it had gone flat again almost before the wheel touched the ground. Again we improvised our jack and had the wheel up off the ground. By this time several children on their way home from school had gathered around us and I noticed one bright little miss was busily engaged chewing gum as fast as her little jaws could go.

Suddenly my old bicycle days came back to me and I remembered having fixed punctures with chewing gum, and without hesitation I offered the little girl five cents for the gum. She was surprised and bashful, but we finally managed to make the trade, and then using the gum to stuff up the two nail holes I again wound the tire with tape and pumped it up. This time it held air and remained hard and firm all during the trip home of more than 25 miles. As an impromptu but most effective repair kit I know of nothing better than this combination of tire tape and chewing gum where a single tube tire is to be doctored.

A COMPARISON.

In conclusion I can honestly say that the light two passenger machine, even at its present stage, is, in my opinion, equal, comparatively, to its larger brother, the touring car. There is no place where my little auto will not carry two persons and it does a remarkable amount of work for its size. I have no trouble in maintaining an average speed of 18 miles an hour and have often covered even a greater distance.

There was a time when no one could talk light weight machine to me. I had purchased one and not had very good success with it because I expected too much of the car and did not want to give half in return of care and attention for what I received in service, but I have changed my tune.

I intend purchasing a touring car again, but there is one thing I have firmly decided on, I will own a light weight machine as well, and if I had to be bound down to one machine I would unhesitatingly prefer a light one.

NEW VEHICLES AND PARTS.

The Ten Ton Morgan Steam Truck.

The illustration herewith shows the new 10 ton truck of the Morgan Motor Company, of Worcester, Mass. The general dimensions of this truck are: Total length, 22 feet 5 inches; total width, 7 feet; loading space, 16 feet 10 inches long and of 116 square feet area.

The frame of the truck is built up of two 9 inch I beams. These are tied together with 3 inch I beams for that part of the frame which carries the loading platform, by two 3 inch channels in front of and 7 inch I beams behind the boiler, and also by the boiler suspension, and two 6 inch deck beams over the rear axle.

The boiler is of the water tube type, the design being something like that used aboard heavy torpedo boats. The steam drum and the two mud drums are of extra heavy steel tube, and have at each end large hand holes, so that the entire boiler may be easily cleaned. These drums are connected by 1 inch seamless drawn steel tubing, the joints being of a special design, which facilitates the replacement of tubes. In case a tube gives out, and there are none on hand for repairs, each opening may be effectually closed by the insertion of a flanged plug. There is a dome above the steam drum for drying the steam before it is taken to the engine. The whole is encased in a double steel jacket with a one inch lining of fire felt next to the flame, and a 1 inch porous asbestos lining between the shells. As a point of convenience it should be noted that by breaking the steam and water connections and removing four bolts the entire boiler may be lifted bodily from the truck. The outer shell also is arranged with the idea of making access to the boiler as easy as possible. The boilers are given a cold water test of 600 pounds and also a steam test of 300 pounds. The safety valve, which is a pop, is set at 225 pounds. The working pressure is 180 pounds. Water is supplied to the boiler by a power pump geared to the engine, the amount being regulated by the usual by-pass.

Either fuel oil or kerosene may be used as fuel in the two burners. The oil is not carried under pressure in the tanks, but is forced into the burners by a small pump, which is geared to the machine.

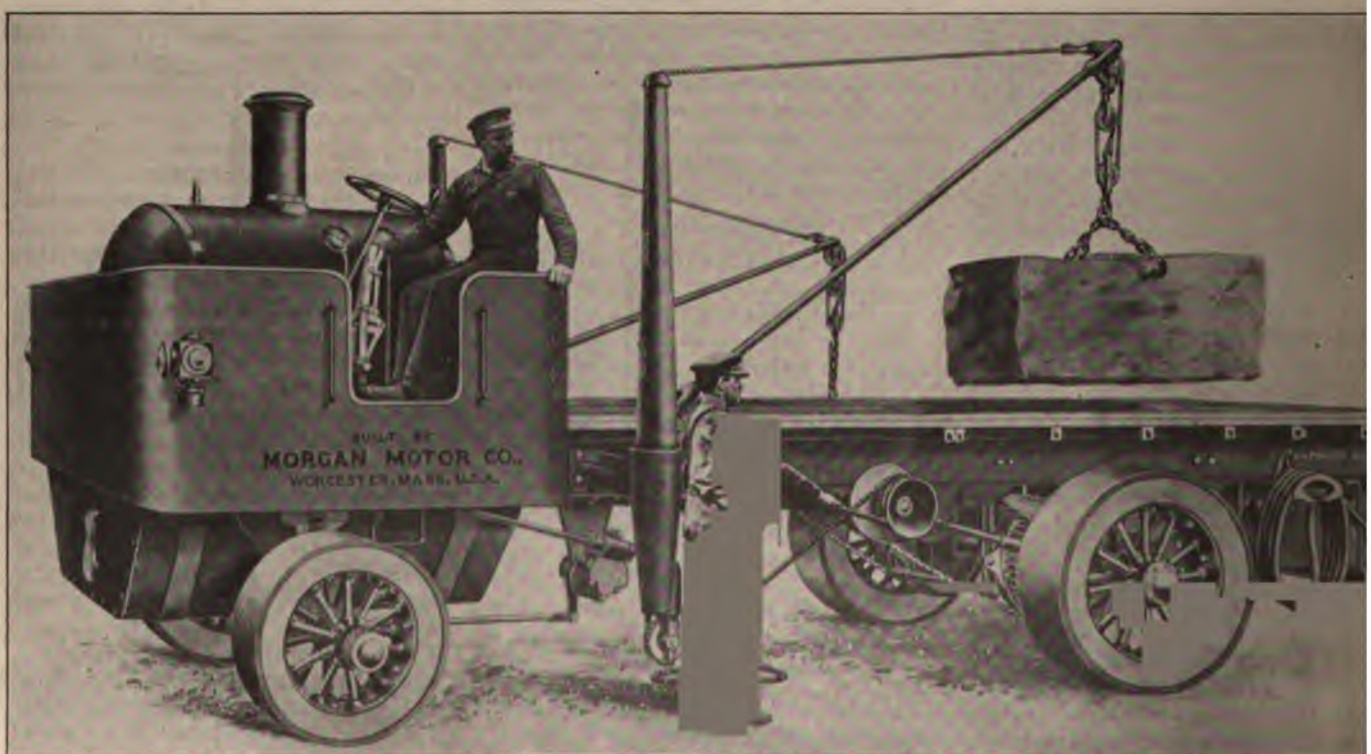
THE ENGINE.

The engine is a double tandem, compound, with the cranks set at 90 degrees. It is claimed to be superior to the cross compound engine, ordinarily used on such machines, particularly in that it is at all times possible to start the truck from a stand and without reversing. The crank shaft and the main gear are formed of a single solid piece of steel. The working parts are enclosed in an oil tight case from which the cylinders are separated by an intermediate frame. This renders it easy to change the piston and valve rod packings and also prevents the steam from passing from the cylinders to the crank case and there condensing. By a special throttle it is possible to admit live steam to the low pressure cylinders, thus very nearly doubling the power of the engine. From the engine the steam passes to a combined feed water heater and separator. The water of condensation is returned to the water tank, and whatever steam may be left passes into an exhaust he of special design in the space ove boiler.

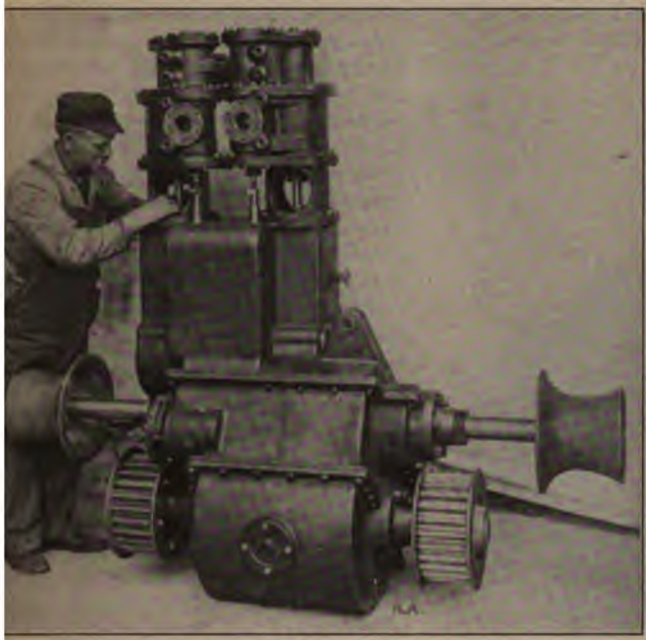
The oiling of the various parts c engine and transmission is taken c by a small power pump, oil being from the lowest point of the case an ried through small copper tubes t various bearings. This system of lubrication drives a stream of oil stantly about each bearing.

TRANSMISSION GEAR.

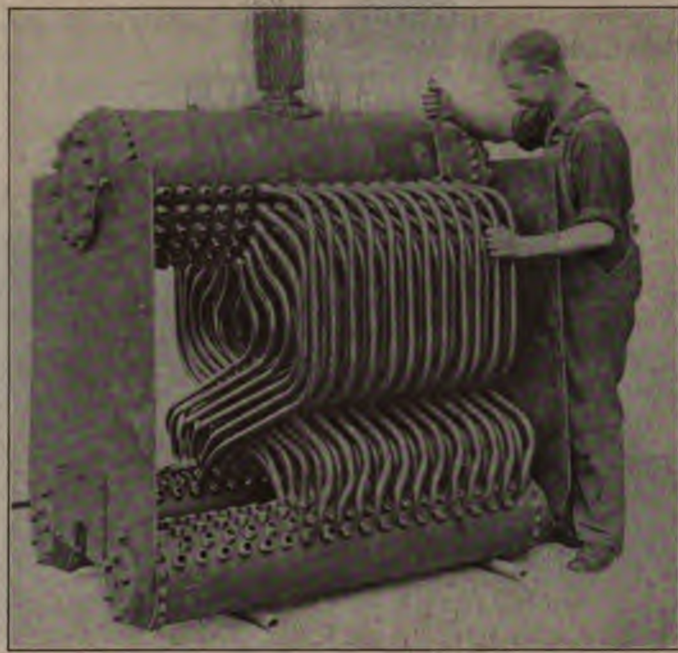
The transmission gear is also e enclosed and runs in a bath of oil. gears only are used on the truck. ratios of gearing are provided; wit the engine makes ten revolutions t of the driving wheels, and with the twenty. The sliding gears are on termediate shaft between the engin main sprocket shaft, the compen gear being on the latter. The engin transmission gears are in a single which is suspended at three points. cylinder end of the engine is conn to the frame by a pivot joint and the two points of suspension are in th and socket bearings of the interm shaft, which are riveted to the two m beams. This method of suspension vents any strains in the gear from communicated to the engine or tran sion gear. The power is carried fron shaft to the rear axle by two 5x1½ pitch silent chains. The large spro are bolted to drums or quills. One is cast onto the rear axle and the is a running fit upon it. Each quill ries a 5½ inch hub, over which the wheel is slipped and made fast. outer rims of each of these quills



New 10 Ton Truc[illegible] Morgan Motor Company, Worcester, Mass.



ENGINE.



BOILER.

ak drums, upon each of which act two es, which are controlled by a small am cylinder. The brake is claimed be very powerful and double acting. roughout the transmission the use of s has been avoided wherever possible.

THE REAR AXLES.

The entire rear axle construction is es- ially heavy. It is not in two parts, the ll construction leaving the rear wheels t to act separately. The axle itself re- ves in two 5½x11 inch bearings, which turn support the rear springs.

pecial care has been given to the de- of a wheel which will withstand the hest usage. The hubs are very large the spokes are of steel. There are two al tires, between which are wood fel- . The rear wheels are fitted with 12 steel tires, which give nearly 2 inches ire surface for every ton of load carried. The front wheels have 7½ inch tires. The pulling strain of the engine is taken off the rear springs by struts, which are braced against the two 9 inch I beams. The front axle, which is under the centre of the boiler, is of 4 inch stock, and supports the main frame on pedestals. Helical springs are here used. The pivot axes are of nickel steel.

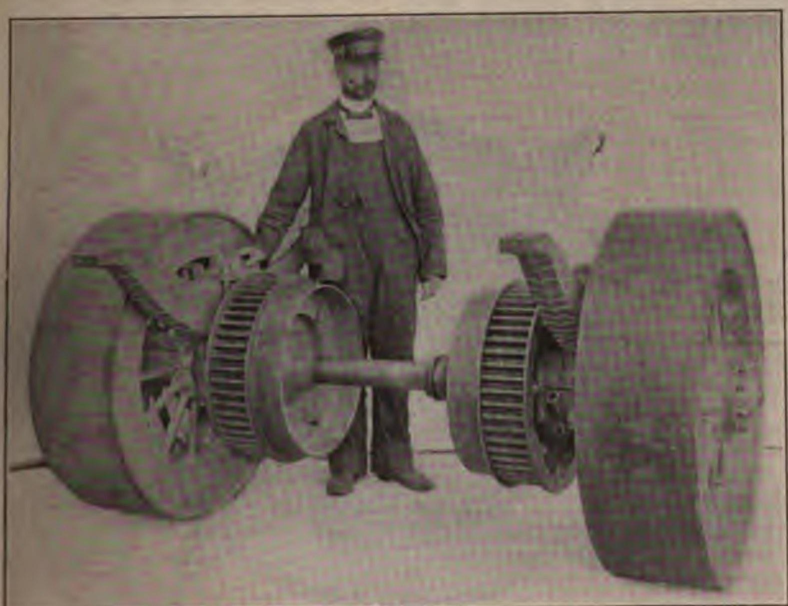
The oil tank, which holds 80 gallons, is underneath the body of the truck, just back of the boiler. It is made of three-sixteenth inch sheet steel. Under ordinary circumstances the tank will hold enough to carry the truck from 30 to 40 miles. There is a hand hole at the top and an outlet at the bottom, so that the tank can be easily cleaned.

The steel water tank is hung at the rear of the truck. It has a capacity of 250 gallons. There are drains on the bottom and a manhole at the top, which is large enough to render it easy not only to wash out the tank, but to scrub it with a broom if necessary or to get inside for painting. The water tank is ordinarily filled by a steam siphon, to which is connected a 1½ inch hose. This is always carried with the machine on a convenient bracket. On the front of the water tank is mounted a small duplex steam pump, which may be used to fill the boiler when the engine is standing still.

The driver's seat is on the left hand side of the boiler, there being a seat on the opposite side for a helper. In front of the driver are the water gauge glass, which is of the reflex type, and also the valves which control the machine. The throttle is of an entirely new design. It is so made that when the lever is pulled back from the centre steam is admitted to the engine, but when the lever is thrown ahead of the centre the full boiler pressure is admitted to the brake cylinder before mentioned, and the machine is brought almost immediately to a full stop. If for any reason the brakes should fail to work, the engine is amply strong to withstand the strength of reversing under steam.

The valves for admitting steam to the low pressure cylinders and to the steam pump are close to the main throttle lever. Steam may be shut off from all parts of the machine by a main gate valve placed close to the boiler.

On each end of the intermediate transmission shaft there is a capstan. It is possible to throw the engine out of gear with the main transmission, so that it acts only upon the shaft bearing these capstans. Hawse eyes are provided at the front and at the rear of the machine. By tying one end of the rope to a tree or telegraph pole and bringing it back through the eye of the windlass, it is possible to lift the truck out of any kind of a hole, so long as the



WHEELS AND TRANSMISSION.

THE NEW LOW PRICED MOBILE.

tree stays in the ground. These windlasses may also be used in connection with jib cranes, of which there is one of 2 tons capacity on each side of the machine. By the aid of these cranes it will be possible to load in very short time.

Low Priced Mobile.

The Mobile Company of America, of Tarrytown on the Hudson, N. Y., are bringing out a low priced steam runabout which they claim to be an improvement in several respects over their standard runabout of last season, which sold at a considerably higher price. The running gear of this machine is constructed of sixteen and fourteen gauge steel tubing. The car has 28 inch wire wheels with 2½ inch Hartford tires. The tread is 50 inches and the wheel base 58 inches. Six and a half gallons of gasoline are carried and 22½ gallons of water. The vehicle has a spindle back seat and tiller steering; it seats two persons, the seat being 37½ inches wide. The special features of the car are a steam air pump, a mechanical cylinder oil pump, a low water alarm and a double acting brake.

The King Automatic Timing Device.

The device herewith illustrated, which is the invention of Charles B. King, and manufactured by the Dayton Electric Manufacturing Company, of Dayton, Ohio, is said to automatically time the point of ignition and is described by the manufacturers as follows:

"A throttle valve on the engine, controlled by the operator, indirectly acts upon the governor as the speed is varied. The attention of the operator in controlling an extra lever is not needed. The visible spark feature is worthy of notice, as the driver can see at a glance whether each cylinder is working properly; if one is causing trouble, it can be detected and corrected. This timing device is arranged to be placed on the dash; it can, however, be connected to any part of the engine. The case being covered with a glass, it is dust and fool proof, and requires practically no attention. The complete weight is about 4 pounds. The device is protected by patents."

Good Roads Lecture at the A. C. A.

On Tuesday evening, November 25, members of the Automobile Club of America listened to a lecture by L. C. Boardman, vice president of the Associated Road Users, on his trip to Chicago in September last in the interest of the good roads movement. The weather happened to be extremely unpleasant and probably for this reason the attendance was not large.

President Shattuck presided and opened the meeting by calling attention to some recent efforts of the A. C. A., through its good roads committee, to have the leading out of New York improv delegation from the club had called the Mayor in this connection, but informed that the subject rather con the borough presidents. The latter, seen, complained that they had not enough to effect the necessary repai improvements. To convince the o of the reasonableness of the plea, were shown a set of photographs especially for the purpose by an photographer who accompanied Pr Shattuck on a trip over the different leading out of the city. These graphs were circulated among the ence at the lecture. The City Compt when called upon, had expressed the ion that this city ought to have a two good thoroughfares leading n

President Shattuck then introdu the audience the speaker of the e L. C. Boardman, who said that the of the trip of which he would give scription had been to induce the a ties to take up the cause of good He drew attention to the vast s money which have been and conti be spent by this State on the Erie and on other public works, which much less benefit to the general than would be a well maintained of public highways.

DESCRIPTION OF THE TRIP.

The trip was made in a Toledo do steam carriage and Mr. Boardman companied by Col. W. L. Dickinso of the Associated Road Users. Th of four—Mr. and Mrs. Boardma Dickinson and a chauffeur—lef York at 11 a. m. on Friday, Septe taking the Forty-second street ferr Jersey side and then taking the County boulevard north. A larg ber of photographs were taken al road, which were reproduced screen. These photos related mo the condition of the roads, showin very fine specimens of State highw

KING AUTOMATIC TIMING DEVICE.

the worst stretches of rutty
·npike that may be found be-
nd Chicago.
man observed that in many
country resident districts the
n the very worst condition,
ons which were poorly built
were often good; but in the
ıey were always constructed
nds. About the worst roads
of New York were encoun-
inghamton. Generally speak-
ls were worse in Ohio than
, and the speaker said he had
in what poor condition the
in the vicinity of Cleveland.

›f the towns passed through
re held by the local "good
siasts, and in not a few in-
ial meetings of the town
re called and resolutions
ng support of the good roads

e observations made on the
t there is an abundance of
ls at nearly every part of the
ıat roads could therefore be
t a minimum cost. Two fac-
ıker said, which very forcibly
rural population in favor of
ıre: (1) That rural free mail
practically dependent upon
In a certain district in Indi-
ıce, the postmaster had noti-
rs that unless the roads were
e delivery must cease. (2)
ol facilities can be much im-
construction of good roads.
ow in every township four
having mostly less than a
In districts where there are
single school is substituted
and the children are carried
school in stages, which in-
ıstruction at a reduced cost.
s not made for records, the
ere comparatively short and
was experienced with the
vehicle itself weighed 1,500
e four passengers and their
d 1,100 pounds more. This
ıeavy load for the machine,
springs developed signs of
soon as bad roads were
·ouble was remedied by put-
springs. Among the other
e that at one time the air
some dust and grit, and in
fused to work. The trouble
by simply cleaning the
ısoline pipe from the tank
became leaky on one oc-
uired attention. Consider-
s experienced with the tires,
se were single tubes, held
ss lugs, and toward the end
when it rained continuous-
week, as the vehicle slewed
the tires were simply
the lugs and had to be re-
v ones.

The distances and running times for the various daily stages were as follows:

Day.	Distance. Miles.	Time. Hours.
1	63	5:47
2	55	4:28
3	42	8:50
4	38	5:32
5	43	6:55
6	33	4:32
7	65	6:50
8	19	2:30
9	78	7:45
10	63	6:10
11	37	4:25
12	56	6:05
13	62	8:00
14	72	8:25
15	27	3:00
16	80	9:15
17	42	4:35
18	70	9:31
19	39	6:50
20	57	9:25
21	24	4:00
22	56	6:20

At the conclusion of the trip the odometer showed 1,086 miles. Only about twenty signposts were noticed on the whole trip, and it was again found that the rural population is generally incapable of giving reliable information of the character and terminals of roads more than 5 miles from where they live.

At the conclusion of the lecture a vote of thanks was tendered Mr. Boardman by the audience.

A TRANS-CONTINENTAL HIGHWAY.

In conclusion President Shattuck spoke of the proposed national trans-continental highway. This highway, he thought, should lead from Boston via Buffalo, Cleveland, Chicago, Des Moines, Omaha and Denver to San Francisco. The American Automobile Association intends to work up this plan the coming winter, and it is proposed to introduce a bill in Congress making an annual appropriation sufficient to build 200 miles of roads. Work might be started at, say, five different points along the route at the same time. Such a highway, Mr. Shattuck thought, would immensely develop automobile touring in this country and would induce European automobilists to come here; it would also generally develop the prosperity of the communities through which it led.

The Eagle Rock Hill Climbing Trial.

The success of the Eagle Rock Hill climbing contest, which was held by the New Jersey Automobile Club on the Eagle Rock Hill, near Orange, N. J., on Thanksgiving Day, November 27, was curtailed by unfavorable weather and other causes. In the morning it was rainy and foggy and exceedingly unpleasant. Toward 11 o'clock the sky cleared up and the sun shone for a little while, but in the afternoon it was cloudy again.

Although the official printed list of entries contained twenty-nine names, at 10 a. m., the hour set for the beginning of the event, only four vehicles had arrived at the foot of the hill. None of the officials were there, as far as could be learned. Contestants arrived very tardily and some difficulty was met with at first in getting the automatic electric timing apparatus to work satisfactorily. Another cause of delay was that the organizers had neglected to obtain a permit from the authorities for holding the contest and the police appeared on the scene and informed them that the contest could not be held without a permit. When everything was finally ready to start the contest it was 12:20.

Entries were taken at the starting post and the total number of entries reached thirty-two, a large proportion of which were private owners. Of these one or two that were at the starting post did not start, owing to the machines not being in good condition. Eighteen were started and thirteen timed at the finish. Five quit before reaching the finish owing to some mishap with the machine or after finding that it was not in perfect condition and could therefore not make good time.

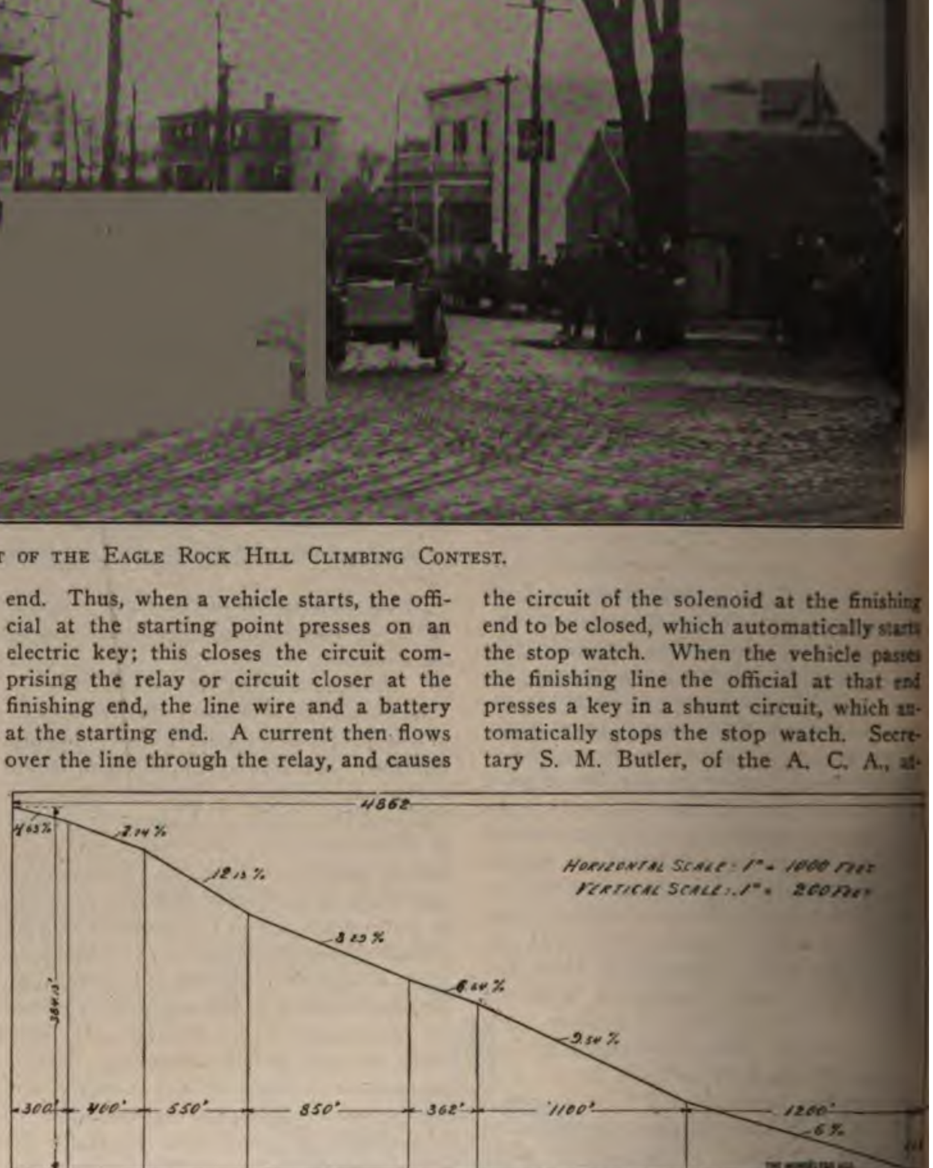
Eagle Rock Hill seems to be a very suitable place for a contest of this kind. No part of the hill is so steep that any vehicle intended for general use should have any difficulty in negotiating it, provided it is in condition. The road is very broad and the pavement is fair all the way up. The roadbed is hard, and while in a few places large stones were seen protruding from the pavement, they could easily be avoided at the necessarily slow speed. As it had rained for three days previous to the date of the trial there was naturally some mud on the surface and the road was quite "greasy."

To give an accurate idea of what the performance of the vehicles in the climb amounts to we publish herewith a map or plan of the hill and a profile of same. The plan was drawn by the county surveyors of Orange and the profile from a statement of the gradient of various parts of the hill by the same authorities, so there can be no question of its accuracy. It will be seen from the map of the hill that the total length is 4,962 feet and the total rise 385.33 feet. However, the start was not given at the bottom of the hill, but about 100 feet further on, at the point indicated by the flag (at the right of the map). The starting point was located at a telegraph pole, which made the installation of the timing apparatus most convenient, since the wires of this apparatus were strung on the telegraph poles. Similarly the finish was located at the foot of a telegraph pole and may have been a little ahead of the point indicated by the flag in the map. The actual distance and rise, as near as could be determined, were therefore 4,862 feet and 384 feet respectively, corresponding to an average grade of 7.9 per cent. The steepest part of the

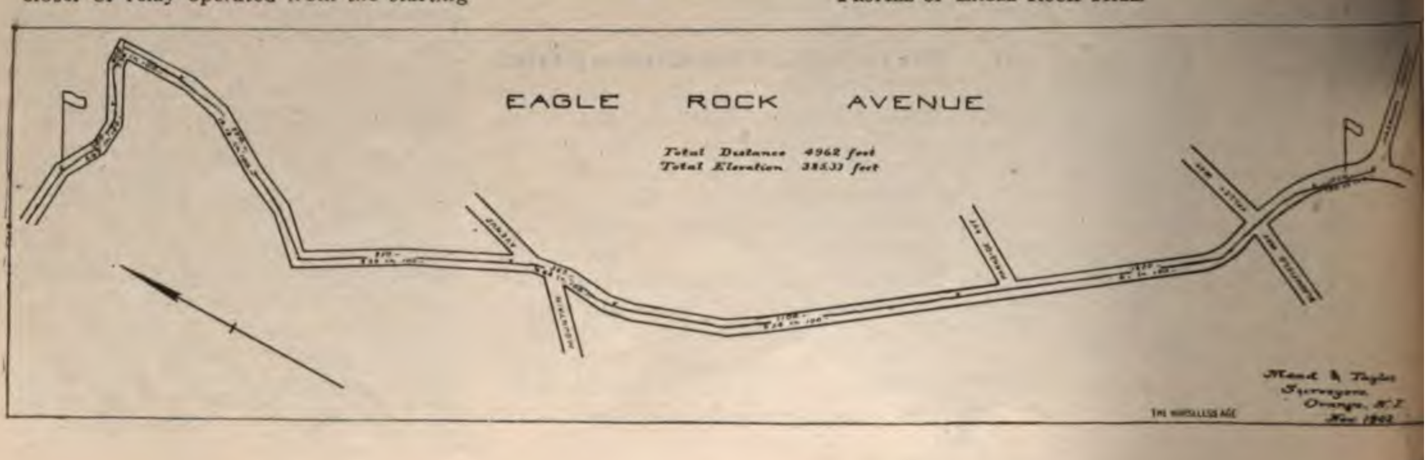
START OF THE EAGLE ROCK HILL CLIMBING CONTEST.

grade is 12.13 per cent., as will be seen from the profile.

The Mors electric timing system was employed. This system comprises a keyboard at each end of the course and an electric circuit connecting the two boards. Only one watch is employed, which is placed on the keyboard at the finishing end. Upon this keyboard is arranged an electro magnet or solenoid, with a movable iron core directly in line with the stem of the watch. Ordinarily the core is held partly out of the solenoid, and out of contact with the stem of the watch, by means of a coiled spring. But when an electric current is sent through the solenoid the core is drawn into the solenoid and presses down the stem of the stop watch, which sets the latter going. The current for the solenoid is furnished by a dry battery at the finishing end. The circuit of the solenoid is made through a magnetic circuit closer or relay operated from the starting end. Thus, when a vehicle starts, the official at the starting point presses on an electric key; this closes the circuit comprising the relay or circuit closer at the finishing end, the line wire and a battery at the starting end. A current then flows over the line through the relay, and causes the circuit of the solenoid at the finishing end to be closed, which automatically starts the stop watch. When the vehicle passes the finishing line the official at that end presses a key in a shunt circuit, which automatically stops the stop watch. Secretary S. M. Butler, of the A. C. A., at-



PROFILE OF EAGLE ROCK HILL.



THE OLDSMOBILE ON THE STEEP GRADE.

THE WINTON ON THE GRADE.

d to the timing in this contest. irst vehicle coming up the hill with test number on it was the red Pres- which competed in the Reliability st. It was driven by H. M. Wells. vehicle was not timed. The next to t the hill was a Toledo steam car- driven by Angus Sinclair. The vehi- s occupied by two persons, and when to near the top of the 12 per cent. stretch it had to be stopped a few minutes to raise steam. It then took the rest of the hill at a fair speed. This vehicle was timed incorrectly. Another chance was offered Mr. Sinclair, but he did not avail himself of it.

A short time later W. J. Stewart came up in a locomobile which had the dashboard and some of the body panels removed. His time was 3:36¾. The contestants who arrived at the finish are given, in the order in which they succeeded each other, in the annexed table, as well as their official time and the make, nominal horse power and approximate weight of the machines. It will be understood that only one competing vehicle was on the hill at any given time. Each vehicle was started a minute or two after the preceding one had passed the finish.

The best time in the gasoline class was made by the Stevens-Duryea vehicle, driven by Otto Nestman. It climbed the hill in 2 minutes and 45 seconds, and thus beat last year's gasoline record of 3 minutes 53 4-5 seconds, established by Charles E. Duryea. The best time in the steam class was made by W. J. Stewart with a locomobile (2:58¾), but it did not compare with the record made with the same make of machine last year (2:42), which was undoubtedly largely due to the greasy state of the road this year.

H. W. Whipple was present with his 24 horse power Packard, which he had entered, but he had various sorts of ill luck. Before the contest began H. M. Wells backed into Mr. Whipple's machine with his Prescott, and partly demolished the radiator on the former. This trouble was remedied by taking out two sections of the radiator and closing the tubes with wood plugs. Mr. Whipple made two starts, but abandoned both times on account of the spark coil working imperfectly.

H. M. Wells had considerable trouble. Besides damaging the radiator on the Packard he threw off the chain on his own machine by reversing the engine, and later on, after having been started, broke a wheel. A number of Prescott machines were present, and another wheel was quickly substituted; but the officials refused another start.

That the Oldsmobile did not make any better time was due to the fact that the engine stopped during the climb, owing, the operator thought, to a short circuit. It responded to the cranking immediately, however. The performance of the Knoxmobile, which was driven by a private owner, is much below what this vehicle is capable of; but the reason could not be learned.

At 2:25 p. m. the contest came to an end.

It may be of interest to calculate from the times of ascent the average horse power developed during the climb by some of the vehicles. The Stevens-Duryea was said to weigh 1,050 pounds, which, with 150 pounds for the driver, makes a total of 1,200 pounds. The motor lifted this weight 384 feet in 2 minutes 45 seconds, or at the rate of 140 feet a minute, which requires 1,200 × 140 = 168,000 foot pounds per minute. If we assume the traction coefficient to be 50 pounds per ton, the energy required to overcome the ordinary road resistance was (1,200 × 50) ÷ 2,000 × 4,862 = 145,860 foot pounds, or 145,860 ÷ 2.75 = 52,000 foot pounds per minute. The total total energy expended per minute was

SHOWING THE STATE OF THE ROAD AT EAGLE ROCK HILL.

therefore 168,000 + 52,000 = 220,000 foot pounds, which corresponds to 220,000 ÷ 33,000 = 6⅔ horse power.

It should be understood that this represents the power developed at the wheel rims and does not include the loss in transmission. The same calculation carried through for the Winton gives 6.76 horse power at the wheel rims and for the United States Long Distance, No. 32, 4.94 horse power.

TABLE OF RESULTS OF HILL CLIMBING CONTEST.

No.	Operator and Make.	Horse. Power.	Wt.	Time. M.S.
9.	Angus Sinclear, Toledo......	..	....	....
3.	W. J. Stewart, Locomobile..	4½	750	3:36¼
5.	I. D. Plank, Oldsmobile.....	4	800	6:06
13.	W. J. Stewart, Locomobile..	4	750	2:58¼
30.	Dr. H. Power, Duryea......	6	900	4:26
7.	D. E. Proctor, Winton......	15	2,000	4:52¼
20.	O. P. Nestman, Stevens-Duryea	8	1,050	2:45
24.	H. M. Odiorne, Long Dist..	7	1,300	5:20
26.	L. J. Wyckoff, Knox........	8	1,400	7:15
32.	J. G. Dale, Long Distance..	7	1,400	4:49¼
12.	E. P. Washburne, Mobile...	4½	750	3:08
23.	H. M. Wells, Prescott......	4½	1,400	3:43¼

At the time of going to press it is announced that there is an error of one minute in the official time of the Stevens-Duryea carriage, and that the actual time of this vehicle was 3m. 45s. This renders the above calculation of power developed by this vehicle incorrect.

The incorporation of the Cook Motor Company, Delaware, was authorized in Ohio, November 18. Capital stock, $50,000. Organizers: Charles E. Cook, Fred E. Cook, L. L. Dennison and John F. Dennison.

...COMMUNICATIONS...

"Grades."

Editor HORSELESS AGE:

Each time I read in your columns the experiences of users of motor vehicles in climbing hills I wonder whether a 20 per cent. grade in other parts of the United States can be as steep as it is in this vicinity. In your last issue a correspondent tells of starting out in the rain "through the most slippery mud we had ever seen." A little later "it was only after repeated trials that we climbed a 22 per cent. grade in 4 inches of mud." Would it be impolite to ask the writer how he measured the grade of that hill? Whether it was short enough to be rushed by taking a run at it from below? And whether he used ropes around his tires, or other means of increasing traction? Because I had really thought it impossible for any self propelled vehicle to accomplish such a feat, no matter what its power, on acount of slipping of tires in such mud as he describes. I once allowed my rig to stop with only one rear wheel in a mud hole, on an otherwise level road, and, having no means of locking the differential, I should have been there yet had I not found something to put under that tire to make it bite. I live in Pittsburg, in a hilly section of country, where it is uncomon to find a quarter mile stretch of street or road without a change of grade; but the other day I called at the office of the city engineer and looked up records of street grades, and the ve est I succeeded in finding was set 15.92 per cent. There is a hill o Negley avenue, within a quarter my home, which people call 18 p and on which I have seen many mobile stall and retire, unable to On the books that grade is only cent. It is paved with Belgian blo other hill is North Fairmount About two months ago a "demon started to take me up there in a ne line car. He said the grade was cent. I asked him how he knew. "Gradometer," with a laugh which acknowledgment of the unreliabilit authority. We stalled dead in low and required some skillful manipul get motor restarted without runnin ward down the hill. That grade books is only 14.66 per cent. In tion with the "gradometer," let n tion, what I presume all know w used one, that inertia causes a vari reading when vehicle is in motion have seen one show 5 per cent. u when I was coasting down hill! other occasion a demonstrator un to show a touring car to mysel friend on Heberton avenue hill. asked if she would climb it. Answ "If it don't, I will give you the ca low gear clutch slipped a little, he out, backed around, and left the h out climbing; but the car was neve ered! That grade on the books 13.5 per cent.

I was in another city with a fr We were taken out in two cars them demonstrated to us. We app a hill on asphalt paved street. M ator said: "I don't know whether get up in high gear or not, with t sengers. It can climb it with o We got to the top without changin though with some loss of speed. tally estimated the grade, on a P basis, at 6 per cent., and asked m ator what he called it. He answe per cent." After returning home I ed over this, until finally I sat do wrote to the city engineer of tha and asked him the official grade particular street, as I happened to ber its name. He answered that two cross streets, which he named, 9.5 per cent., and between the se these and another it was 9.9 per cent. was pretty close to 10, and seeme out my operator; but still I was n fied, and went to friend S. and ask if he remembered that particular h what he thought the grade was. swered at once, "About 6 per c told him about my correspondence, said: "I was rod man on a surveyin for three years, and learned to grades by looking at them, and t no 10 per cent." That brings m to my starting point, and again der whether a grade of "x" pe in Pittsburg is not about twice

de of "x" per cent. in any other
:an you help me?

R. W. B.

general unreliability of grade es-
s well shown by the literature on
e Rock Hill Climbing Contest. If
neter is to give accurate results it
used very judiciously, as inertia
ribution of weight on the springs
ect its readings. The steepness of
s generally overestimated, rarely
imated.—ED.]

Ignition Queries.

lORSELESS AGE:

ump spark reduced in length by
sion? If so, how much?
a gasoline motor is running per-
ould it miss? W. E. EVANS.

ipark is reduced in length by com-
; we have no rule for how much
iuced, but spark coils are usually
that they will give a spark three-
of an inch long in the atmos-
'hile in the engine the spark plug
re only about one-sixteenth of an
.rt.
an engine misses explosions it
run perfectly.—ED.]

New Jersey Hill Climbing Contests.

lORSELESS AGE:

' be of interest to your readers to
one by one and examine the vari-
ditions of the New Jersey Club's
annual contests, the last of which
took place in Orange. The time
in these two cases can only be
d with due regard to these vari-
rences in conditions.

the hill used in the two tests was
e, one notes, first, that the total
last year was about 40 yards
than this year. The roadbed, on
r hand, was much better last year
s. This year the mud was often
deep, as rain had fallen for twelve
fore the contest.

ıg now to the competing car-
ve find that a standing start was
last year, whereas a flying start
wed this year.

d this we note that last year the
isted upon two occupants, while
only one was required.

we come to examine the time
on the two occasions, we find that
rart was the only competitor who
same machine or similar machines
th occasions. We must assume
ıdition was good in both cases. In
the time last year was 2m. 43s.
year 2m. 58s., a difference of fif-
ınds, or 9 per cent., an argument
o show a slower track this year.
consider the sum total of the con-
we are again in doubt. Thus we
nferior roadbed, but better condi-
to distance, start and number of
rs this year.

I have made no reference to the remarkable time recorded by the Stevens-Duryea carriage, as I am informed some doubt is expressed as to its accuracy. The Mors timing mechanism did its work well. In future two timers should make independent examination of the recording chronograph, as in this way alone can such an embarrassing situation be avoided.

DR. HENRY POWER.

A Suggestion for the Control of Fire in Flash Generators.

Editor HORSELESS AGE:

Some time ago I happened to see an automobile using a flash generator that was stalled because the thermostatic regulator having gotten out of order, the fuel could not find its way to the burner. In vehicles using that kind of a generator would it not be simpler and more satisfactory to have a heat indicator that could be read from the seat and have the fire entirely controlled by hand?

ERNEST DUVAL, M. D.

An Automobile Run from Boston to New Haven and Return.

Editor HORSELESS AGE:

The following is an account of a trip I took in a steam machine to New Haven and return, to see the game between Harvard and Yale on Saturday, November 22. I shall try to be as accurate as possible and to describe the trip in as much detail as is necessary to make the story of interest to the readers of THE HORSELESS AGE.

On Thursday night, at 10:30, six machines lined up opposite the auto station in Quincy square, Cambridge, three steam carriages and three gasoline, included in the former being George Cannon's racer. All the carriages were bedecked with Harvard flags, some being tied to the sides and others fastened to the side lamps and front seats. With tootings of horns and the cheers of the throng of onlookers we started for Worcester, where we intended to make the first stop.

Our route lay up Newton boulevard, and although it was expressly stipulated in the beginning that there was to be no racing, the temptation was too great and consequently we "let 'em out" up the boulevard until we reached the street where we were to turn off for South Framingham. Here we halted, waiting for the machines that had not raced up the boulevard, and after we had one and all collected we again started for Worcester. The road led through Wellesley Hills, Wellesley and Natick, where we stopped to get water and a bite to eat, and in about an hour and a half we reached South Framingham, where a halt was called, as some of the machines needed to be oiled and the lamps attended to. As the road was clear and straight to Marlborough, three of us, a De Dion, Cannon and myself, decided to go on and not to wait for the rest of the machines, agreeing to wait for them in Marlborough, where we had to get water again.

We started, and when I got to the watering trough in Marlborough no one was to be seen; I waited for three-quarters of an hour, and then started on, thinking that the other fellows had taken another road. The road from Marlborough to Worcester is perfect for 15 out of the 18 miles, and we raced along, hoping to catch the other machines before they should have arrived at Worcester. Outside of Marlborough my

ONLY MISHAP ON THE TRIP

occurred, and this was merely the breaking of a string which is connected with the water indicator. I tied a knot in the string and proceeded after fifteen minutes' delay. At 2 o'clock we reached Worcester, going to the Bay State Hotel, and imagine our surprise when we found that no one had arrived! We got something to eat, and in about three-quarters of an hour one steamer showed up, but no news of the other machines was forthcoming. Well, we took the machines around behind the hotel, where I oiled the engine and filled the water tank. At 5 o'clock, as no one had appeared, we thought it best to go on to Springfield, hoping to get some news of the remainder of the company there.

Those who took part in the recent endurance run will, I am sure, remember the road between Worcester and Springfield, but for the benefit of those who have not been over the road I will say that it is very poor. As far as Warren the road is really quite good, a few hard places being encountered in the Spencer hill and the Leicester hill; otherwise the road is as good as one could wish for. Just outside Warren I stopped to get water and found that my

STEAM GAUGE WAS FROZEN.

The cold was biting, a heavy frost covered the ground and a stiff wind was blowing at the same time, and I was not surprised at the freezing of the gauge. Another steamer showed up in a few minutes and we started for Palmer, where I figured I should have to get water again. The road now became miserable; sandy, hilly, rutty and stony in a good many places. But my machine seemed to push along all right and at 8:30 we reached Palmer, where I filled up the water tank for the last time until we reached Springfield. One of the steamers had not shown up, and after waiting for half an hour we decided to go on without it, as I wanted to get to New Haven that night if I could. But just as we started they came around the bend and so we waited for them to fill up with water.

A QUEER DELAY.

We asked the reason for their delay in reaching Palmer and found that in unscrewing the cap to the gasoline tank the cap had shot off into t[illegible] and some

time had been spent in looking for it. But time was made up after they found the cap.

The road now improved somewhat, and after passing through the Wilbrahams a State road carried us into Springfield, where we arrived at 10:15. Our fellow tourists had not shown up, but I supposed that they were coming along at a terrible rate of speed and would show up any minute. My friend who was with me and I went to a hotel where we got a room, both of us being tired out and very sleepy. We had left word at the auto station in Springfield that if anyone showed up, to send them to the hotel. We had been in bed about two minutes when a pounding on the door announced the arrival of the others. They had got in a few minutes behind us, having done the last 8 miles in seventeen minutes! That was certainly mighty good work on those roads! We talked it over and decided to get a good dinner and push on to Hartford, as nothing had been heard from the other machines; and so after a good meal we went back to the auto station, whence we started out, leaving the other steamer to fill up with gasoline. They said that they would catch up before we had gone far, and I thought that they would, for the wonderful speed their machine had shown made me feel that I must get as far ahead as possible, so as not to keep them waiting when they should catch up with us. The road from Springfield to Hartford is neither good nor bad, and we went along all right until we got to Windsor Locks, where we stopped for water. The other machine was not in sight when we left Windsor Locks, and as a matter of fact we did not see it again until we got to New Haven. On the way to Hartford I was so tired that I

COULD HARDLY KEEP AWAKE.

My friend was fast asleep at my side and I was thinking of "home and mother," when I, too, fell asleep, running the auto into a ditch. No harm was done, however, but when I went to sleep for the second time a little further along I thought that the best thing to do was to leave the auto in Hartford and take the train to New Haven. This we did, getting on the train at Hartford at 5 o'clock and sleeping on the car from 7 that night until 9 the following morning. So far the trip had been a great success, as far as I was concerned, but I could not imagine what had become of the rest of the party who had left Cambridge the night before and whom we had not seen since we left them at South Framingham.

My friend and I wandered around New Haven that morning, having previously gone to the auto station in Meadow street, where we found the other steam carriage, but no one else of the party that had started out from Cambridge the night before. Later on, while walking up Chapel street, we came across two of the gasoline machines in front of the New Haven House. Then we learned what the trouble had been. One of the machines had carburetor difficulties on the road from Framingham Centre to Marlborough, and a long wait ensued, causing the delay in arriving at Worcester. Then, too, we learned that a wait was made for one of the steamers on the same road, the machine having taken another way. If we had waited ten minutes more in Worcester we should have seen these machines, but at that time we figured that if it took three hours for the machines to come from Marlborough to Worcester, a distance of only 18 miles, they must have either gone ahead or that something of a very serious nature had happened. On the road from Worcester one of the gasoline machines broke the air pump and rod, but managed to run well enough. Another had come through without a mishap, having waited for those who had been unfortunate enough to have experienced troubles of one kind or another.

There is no need of saying anything about the game. We saw it and were not sorry to get out of New Haven as quickly as we could. One steamer and two gasoline machines were to run up as far as Hartford, where the night was to be spent. I had to get back to Cambridge by 2 o'clock the next afternoon, so I took a train for Hartford, where I had left the machine. It was

A POURING RAIN STORM

when we left New Haven, and the prospects for a good run to Worcester at night were not encouraging, but I kept to my intention, and when we got to Hartford the rain had let up a bit, but it was getting very cold. We went to the hotel, had a good dinner and started for Springfield at 11 o'clock, the fellows who left New Haven not having shown up at the time we left Hartford.

The road was in an awful condition for most of the way. The ruts were a foot deep, with a thick, heavy mud, and the rain cut into our faces and ran down inside our clothing, and if it had not been for some oilskins which we bought in Hartford we would have been soaked through by the time we had gone 2 miles. A little way outside of Springfield the lamp on the right hand side of the carriage fell off and was crushed by the rear wheel, leaving us just one light for the rest of the way. We got to Springfield at 1:10, where we took on some gasoline and water, leaving the lamp and a broken mud guard to be sent by express to Cambridge.

At 1:50 we left Springfield. The stars were now out and we hoped to get the light of the moon by 3:30. The road was in bully shape, the rain having been just enough to lay the dust and to make the road fairly hard. At Palmer we took on water and went on over the road which the day before had been so poor. I was surprised to find in what excellent shape it was, for we could make very good time, much better than the day before. off the road for a few minutes at but found it shortly afterwards on to West Brookfield, where w again for water. Brookfield, Eas field and the Spencer Hill wer without incident. We stopped at at the foot of the Leicester Hill and at just 6:01 we passed the in Worcester, having done the miles in 4 hours and 10 minutes, three stops for water—nothing able, of course, but pretty good f machine of but 4½ horse pow getting breakfast and making on friends, we started at 9:30 bridge.

Just after passing through Sh

A DRIVING SNOW STORM

set in, and for more than forty snowed thick and fast, the cold tensified by a high northwest 10:35 we reached Marlboro, stopped and got some hot cho found that we had water enoug us to South Framingham, and was a gasoline vehicle starting ahead I thought I would try and a "go" as far as he went. Well two short cuts, of which I did coming out ahead of us each tin the final stretch into South Fr I passed him and got to the tro a quarter of a mile in the le he went ahead, for I had to sto water. From South Framin nothing of interest occurred, an we pulled into the auto station bridge, having been on the roa teen hours.

In conclusion, I will say that

ALL HAD A DANDY TIME

The trip was a great success in in spite of the mishaps to on and one steam machine. The the latter got plugged up, makin sary to leave the machine at on the way down. Another ga chine would have had a perfect for the fact that in backing station in Worcester, on the r the rear sprocket broke, mak possible to go on. The fello other steam carriage lost their road from New Haven to Ha when they finally reached Merid in the morning after five hou they decided to leave the mac and come on by train. The thi machine came through all righ funny incident occurring on the Worcester. They were not qu the way, and the "genius" of suggested that they "steer by Star." Everyone was so inte losing sight of that star that th not as carefully watched as it been, and when the machine gully so hard that the rear sp I am told that some difficult perienced in distinguishing Star from other stars which eac

sly enough, at one and the same However, everything came along in ıhape, and I don't think that anyone party regretted for a minute that ǀ taken the trip.

CYRUS BREWER.

nvented a Reversible Gasoline Motor.

HORSELESS AGE:

writer believes it is very often rious or freak inventions that lead d improvements and the radical de- : from usual construction that leads :at improvements. I first got the hat a reversible flexible gasoline would be the best for carriage use .th that idea in view designed a mo- ıt could be started and stopped by g a controlling lever similar to the e lever on the steam machine, the and power also being controlled by ver and the reversing being done by r lever. This construction would the motor to be connected directly differential gear, the same as in machines, if desirable. After study- e problem carefully, drawings and ıs were made; the experimental was started in the shop, and finally ; ready to try the experiment. It lly did not start at "the first crack," evelop twice as much power as it :signed for, but it did run, although of the construction was faulty, as is to be the case in the first machine. ponded to the reverse lever and l in either direction from any posi- would stop in. It was a very quiet g gasoline motor and could be made ıieter by improvements in the valve It also ran with very little vibra- s the reciprocating parts were care- ıalanced and the shock of the im- appeared to be nearly all absorbed ınteracted by an opposing cylinder. ıotor was run in the shop with an :xhaust pipe, about 5 feet long, and ıt make any more noise apparently steam engine of the same size and g at the same speed, and the ex- would not require much muffling :e it as quiet as desirable.

writer did not make any break tests :rmine the power or efficiency, and :sirable improvements suggested :lves it was the intention to make :hanges and get some good running ʀith body to give it a practical test, the season opened soon after, the invested in a steam machine, which ırds became the victim of a success- periment. This ended the experi-

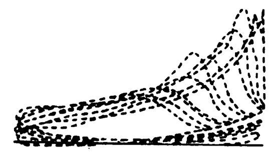


FIG. 4.

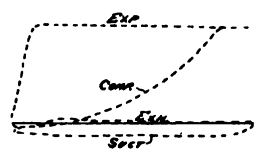


FIG. 5.

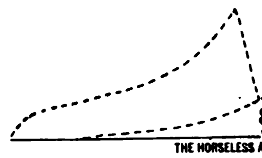


FIG. 6.

menting with the reversible flexible gasoline motor for a time, but it was sufficiently successful to make the writer confident it can be made a very practical motor of high efficiency.

This motor would, no doubt, be better adapted to stationary or marine work than for carriage propulsion; as the writer is now convinced that the most successful motor will be the simplest air cooled valveless motor.

H. J. WILLARD.

Are Looking for American Electric Vehicles.

DEVIZES ROAD, SWINDON, England, November 18.

Editor HORSELESS AGE:

We should feel very much obliged if you would kindly give us any information in regard to electric cars as manufactured in America. We are in a position to place an order immediately for a suitable electric car of the surrey type to seat four persons and, if possible, with accumulators to last for a distance of, say, 100 miles. If you know of any firm who can supply such a car or cars would you kindly ask them to write us direct as soon as possible. The writer will very probably be in New York early next year and would then take the opportunity of inspecting any suitable car.

J. C. CROWDY,

Swindon Electrical Engineering Co.

Throttle Control.

Editor HORSELESS AGE:

Referring to your recent editorial on "Motor Control by Exhaust Throttling," I believe that as between exhaust and charge throttling all the advantages are on the side of the former. The certainty of ignition and uniformity of the mixture are certainly greater with exhaust throttling, as the inlet passages remain always the same and the new charge remains on top (in a vertical engine), near the spark plug, so that there is no reason why the ignition should give trouble. My idea is to connect the exhaust throttle mechanism with the spark timing mechanism, so that the positions of both may be varied simultaneously in the same directions—that is, when the charge is throttled most the spark occurs later. I think it would be difficult to conceive another method of regulation that would result in a more quiet motor and one running more steadily at low speed.

"I send you herewith blue prints of indicator diagrams taken from a stationary engine designed by myself, partly for experiments and partly for useful work; and it has given me great pleasure to try various experiments on this engine. The cylinder diameter is 4 inches; the stroke, 8 inches, and the normal speed 360 revolutions per minute. It has tube ignition and works with hit and miss exhaust control. The explosions are entirely cut out when the governor acts, but I changed this to take the diagrams Figs. 1 to 4. Diagrams 5 and 6 were taken with the exhaust fully open.

J. M.

[The cards, Figs. 1 to 3 and 5, were taken with a 20 pound spring; Figs. 4 and 6 with a 100 pound spring. In the original cards vertical height of 1 inch represented 20 pounds pressure. The cards in the cut have been reduced two and one-half times.

In taking the cards with the 20 pound spring, a stop pin was put on the indicator which prevented the spring from compressing beyond that point and the pencil from rising higher; consequently when the pressure in the cylinder is higher than that corresponding to this point, it is not indicated, but a straight horizontal line is traced by the pencil, like that marked "expansion," which indicates that the pressure was higher than the indication limited by the stop pin.

In Fig. 1 the engine is throttled down to a low speed by the exhaust. The exhaust line shows that shortly after the beginning of the exhaust stroke the pressure in the cylinder drops below that corresponding to the adjustment of the pin—about 28 pounds. The pressure drops gradually until about two-thirds stroke, when it reaches a minimum—about 10 pounds above atmosphere. At this point the exhaust valve evidently closes, for the pressure now rapidly increases and becomes 23 pounds above atmosphere at the completion of the exhaust stroke. During the suction stroke now following the exhaust gases compressed in the cylinder expand again and atmospheric pressure—at which suction begins—is reached only after nearly one-half the stroke is completed. Consequently, only about one-half of the full charge is drawn in, but the power obtained is much less than one-half the maximum, owing to the lower efficiency at light load. In fact, the card in

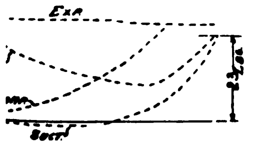


FIG. 1.

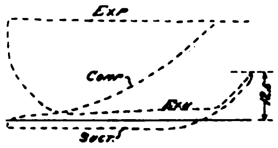


FIG. 2.

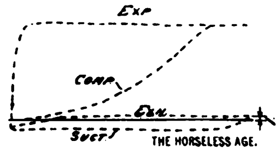


FIG. 3.

the original was marked "working light." The maximum valve lift was only one-thirty-second of an inch.

Fig. 2 is in every respect similar to Fig. 1. It corresponds to half load and to a valve lift of one-eighth of an inch. The pressure in the cylinder at the end of the exhaust stroke is only 12½ pounds above atmospheric, and atmospheric pressure is reached after about one-quarter of the suction stroke has been completed.

Fig. 3 corresponds to full power—i. e., no throttling. It may seem rather peculiar that the exhaust pressure drops below atmospheric at the beginning of the exhaust stroke, but the reason is probably that the exhaust valve opens three-quarters of an inch before the end of the expansion stroke. It closes on the dead centre, and there is then about 1 pound above atmospheric pressure in the cylinder. The maximum valve lift is three-eighths of an inch.

In Fig. 1 are shown curves taken with a 100 pound spring for various positions of the exhaust throttle. This card confirms what is already well known—viz., that the explosion pressure rises much slower when the charge is diluted and the maximum pressures are much less than with a fairly pure mixture. It will be observed that the compression curve is the same for all the diagrams in this figure, thus bringing out the distinguishing feature of this system of regulation—constant compression.

Fig. 5 is a diagram taken from the same engine when fitted with a hit and miss governor. It is, of course, essentially the same as Fig. 3. Fig. 6 shows a diagram taken under the same conditions with a 100 pound spring. The compression is 50 pounds to the square inch and the mean engine pressure 63 pounds.—Ed.]

Long Tour in a Motorette.

Editor Horseless Age:

As evidence of the practicability of the light weight runabouts, by some referred to as "only toys," your readers may be interested in this brief record of a New England trip made by the writer in a 3½ horse power motorette weighing about 700 pounds.

I left New York October 1, the week before the Endurance Run, following their route to Boston, and before my return going as far East as Portland, Me., as well as traversing the eastern part of Massachusetts quite thoroughly. Upon reaching New York again, on November 6, the odometer registered 1,800 miles.

While most of the roads were good, particularly those in the old Bay State, some very poor ones were encountered in southeastern Massachusetts and in Maine. I recall a 30 mile stretch between Taunton and Plymouth (Mass.), almost the entire distance sand.

Another spot will not be forgotten. Between Derby and New Haven, where a new trolley track was being laid, heavy teams and recent rains made a half mile literally a "sea of mud" 8 to 12 inches deep over the entire width of the road. The average speed throughout the trip was 15 miles, with the exception of two or three days, when particularly bad roads were encountered.

The spark coil gave some trouble and the wires were found to be broken under the removable terminal parts, giving poor contact, but we ran into Boston all right and had it repaired for $1.

No other trouble was experienced, except that the pounding on some of the rough roads loosened some of the muffler bolts, causing an annoying rattle. To remedy it the muffler was finally removed and new nuts made in a machine shop, the heaviest expense of the trip.

The tires were punctured five times and repaired by me without expense, an extra union tube being carried. One valve stem was cut off through the tire going flat after puncture, and a new one fitted at expense of 75 cents.

The motor and transmission required only the ordinary attention, the transmission shaft bearing requiring adjustment once. But one spark plug was used; one trembler spring was broken.

New Jersey.

An Electrician Prefers the Electric Vehicle.

Editor Horseless Age:

I have read with interest your articles from correspondents in regard to experience with automobiles and can truthfully say that these articles are what makes your paper valuable to myself and various employees who are interested in autos. These experiences are most valuable to all owners in showing them what to look for and to avoid. I read with pleasure the article by Mr. Damon in your last issue and can tell him a little more about electric automobiles, having owned an electric "road wagon" for a year and a half.

He will find that his first set of batteries will play out on him in about four to six months, especially since, as he says, they have been heated to the boiling point; but he should not be discouraged on that account. Experience has to be bought with an electric wagon just as with any other. The next set of batteries will last a long time, if he knows how to care for them, and there never will be a time when he will not be able to go "right there" with the electric automobile.

We have in our care steam, gasoline and electric wagons, and the most reliable and serviceable wagon for a person who wants to keep clean and do nothing but ride is the electric, by all odds.

My electric wagon never breaks down, never leaves me out on the road, never refuses to pull and utterly defies the weather; it is just as reliable as a street car and is used by me in place of street cars, taking me to the office in the morning, back and forth at noon, home again at supper and usually for a 10 to 15 mile ride after supper. All the bearings are just as good as new, the wheel gears (on the hubs) have never worn out. The armature pinions have been replaced only once, at a cost of $2.50, and the motor bearings and commutator show absolutely no wear at all. I broke two reaches one time by running into a hole in the pavement, but as there were four of them the other two carried the load for some time until I had an opportunity to brace up the broken ones. The reaches broke off short at the motor clip which carries the front end of the motor.

The battery troubles were entirely due to ignorance, to start with. After having the best satisfaction for four months I tried an endurance run to the country over 15 to 25 per cent. grades, and after about 20 miles of this finished by pulling through 3 miles of deep sand. The average discharge in amperes for the whole run was about 45, and the rapid discharge so softened the active material of the plates that it began to fall out and soon filled the bottom of the cells, requiring frequent washings to keep off short circuits in the cells. Four months more saw the batteries going back to the factory for new positives. I have since learned that if the factory says the normal discharge rate of your battery is twenty amperes it is wise not to exceed that figure for any great length of time or you will have trouble.

Battery renewals can be kept down to $50 per year, freight on same will be about $10, charging bills will average $5 to $8 per month, care and attention $2 per month, making $180 per year for an average of 15 miles per day, or less than 3½ cents per mile, not counting cost of vehicle.

The ever ready feature, coupled with the certainty of getting there, the cleanliness, the safety with which it can be left in the street anywhere, make the electric the only real pleasure vehicle of them all.

Henry Garrett.

Immunity from Tire Troubles.

Editor Horseless Age:

In reading your last issue I notice in the communication from Mr. Damon that he seems skeptical as to there being such a thing as low cost of tire maintenance on automobiles in constant use. I think that location and class of roads have much to do with tire troubles. For instance, my record of three years is something as follows:

(1) Steam surrey, about 600 miles without puncture or tire trouble of any kind.

(2) Heavy gasoline machine, about 2,400 miles, a good proportion of it over Vermont country roads when frozen, and without puncture, except on the last run, when I picked up a nail and also forced

;lass into the same tire, which :fore I could get home.

season I have been away some but have run a 16 horse power : nearly 1,200 miles practically)king at the tires, having in- but once, and so far as I can he exception of a few surface re good for twice that. Have light gasoline machine the lat- the season about 500 miles puncture, and have given the tention, except inflating once

be luck, but I think it is on the country roads over which es have been used. Although different machines for the past and have had my share of the iobile troubles and wayside re- [am still very green on tire I have never had occasion to ı, except in the case of the chine mentioned. I have al- that the immunity from tire running machines in this lo- a sort of compensation by the grades and road surfaces :onstantly encountered.

W. D. WOOLSON.

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atic Superheat Regulators.

SELESS AGE:

'erent types of thermostats are ulating the temperature of the steam generated in flash and ıoilers?

: thermostats patented?

B. H. G.

v of only one thermostat actu- r this purpose—the White—and nted.—ED.]

...OUR... ıN EXCHANGES

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le Storage Battery Data.

:cent congress of the French for the Advancement of Sci- ber of papers were read on the ırage batteries for automobile Lavezzari submitted some ex- data of electric automobiles Paris during the winter, 1901- weighing 3,960 pounds, includ- y of 1,540 pounds, could on an ke 114 trips before the positive ıc battery had to be renewed. one-half this distance had been : cells were washed out. The ;e was 28 miles. The negative still in good condition after The conditions were more fa- /ehicles for hire, as in such the rs are naturally not abused to tent. A coupé weighing 4,400 which 1,584 pounds was bat- on an average 185 trips before the positives required renewal. Another vehicle of 3,960 pounds, including 1,100 pounds of battery, withstood no less than 338 charges and discharges, during which the cells were only twice washed out.

Some figures relating to weight, power required and cost were given by L. Jumeau. The average consumption of energy is, according to common experience, 116 watt hours per ton mile, so that at an average speed of 12½ miles per hour the power for a vehicle weighing with load one ton figures out to 1,450 watts. The ratio of battery weight to total weight is usually between 25 and 30 per cent.; in no case more than 35 per cent. for commercial vehicles, inclusive of all accessories, such as trays, connectors and cables, which may weigh as much as one-seventh of the battery proper. For such vehicles, then, the weight of the cells is 604 pounds per ton and the weight of the battery complete 700 pounds per ton. The relation between the weight of the cell to the weight of the electrodes varies with the type of electrodes used. For the different French automobile batteries this ratio varies between 1.33 and 1.6. This ratio is, of course, greater the lighter the electrode and the larger the electrolyte capacity. With a ratio of 1.6 the total weight of the cell is made up as follows: Electrodes, 1.00; hard rubber cell, .10; electrolyte, .40; various parts, such as separators, covers, etc., .10. Accordingly the weight of electrodes for a vehicle weight of 1 ton is:

$$\frac{604}{1.6} = 377 \text{ pounds.}$$

The specific rate of discharge is therefore

$$\frac{1450}{377} = 3.85 \text{ watts per pound,}$$

and the current—calculating on a mean pressure of 1.9 volts—about 2 amperes per pound. A table of French batteries of the pasted type indicates that these rates of discharge can be sustained in a five hour discharge, and consequently a mileage of $5 \times 12\frac{1}{2} = 62\frac{1}{2}$ be obtained.

The Baker electric vehicles are being introduced in England by Samson Parsons, of Darlington.

A Napier car will represent the Automobile Club of Great Britain in the next Gordon Bennett Cup race.

The mile record on a straightaway was reduced to 42 seconds by Angieres on a Mors racer at Dourdan, France, a short time ago.

The gasoline engine muffler competition of the Automobile Club of France will take place December 20. A first prize of 1,000 francs has been donated by Darracq & Cie.

The Sultan of Morocco, we learn, has not been able to do long without an automobile. Through an importing house in Tangier he has just bought a new gasoline automobile manufactured by Stoewer Brothers, of Stettin, Germany.

A series of four lectures on automobiles will be delivered by W. Worby Beaumont before the Society of Arts, London, next April and May.

For the first time British automobile manufacturers will be represented at the Paris show, space having been taken by the Napier and Wolseley companies.

A new six hour motor bicycle track record was made by F. W. Chase on the Crystal Palace track, London, November 18; distance, 228 miles 250 yards.

A new English car is fitted with a wheel steering device on which the angle of the steering post and the height of the hand wheel can both be adjusted, the latter through a distance of 5 inches.

The A. C. G. B. and I. contemplates installing in the new motor storehouse an apparatus by which the effective horse power on the road wheels of an automobile can be accurately ascertained.

A Frenchman has invented an illuminated sign for automobile repair and supply stations, consisting of an automobile with a light inside, which can be seen at a distance at night by automobilists in distress.

It is said that the American Westinghouse Company have received an order from the King of England to supply a gas engine and dynamo plant at Sandringham for the purpose of charging electric automobiles.

The new racer (a nominal 70 horse power) under construction by the German Daimler Works will have a four cylinder motor with 6.8 inch bore, 5.6 inch stroke, running at from 1,000 to 1,200 revolutions per minute.

Referring to the Gordon Bennett Cup Race, the *Automobile Club Journal* says: "The opinion prevails that a circular road of between 50 and 60 miles might be found in Ireland, which, although perhaps not absolutely an ideal road in every respect, would at the same time afford a really good sporting course, including long stretches of absolutely straight road."

The A. C. F. has declined the proposal of the A. C. G. B. and I. of united action of the various national clubs for the revision of automobile racing rules upon international lines. One of the main points of the proposed rules was that interational racing committees should be composed solely of bona fide owners not interested in any auto manufacturing enterprise.

MINOR MENTION

Joe Colangeloe proposes to introduce a motor hack service at Conneaut, Ohio, next year.

At Raleigh, N. C., W. H. Brewer is erecting an automobile repair shop 30x60, with wing 25x40, on Hargett street.

In Terre Haute, Ind., where nearly twenty automobiles are owned, the organization of a club is being talked of.

The John W. Brown Manufacturing Company, Columbus, Ohio, are placing on the market an oil burning automobile lamp.

A dealers' automobile show is projected in England, to be held early in February, between the New York and Chicago shows.

L. N. Southworth has been appointed receiver for the Remington Automobile and Motor Company, of Utica, N. Y., under bonds of $10,000.

At Indianapolis the C. G. Fisher Automobile Company has bought for $10,000 the property at 330 North Illinois street to erect an automobile store.

A report from Syracuse, N. Y., states that Albert and C. S. Lewis, of that city, are about to engage in the manufacture of a gasoline automobile of their invention.

H. S. Turner, Jr., R. B. Whitman and A. C. Webb arrived at Chicago November 24 from St. Louis in a St. Louis gasoline carriage, having spent three days on the road.

W. Leon C. Kenan, chief draughtsman of the Continental Automobile Company, and Joseph Tracy, with Smith & Mabley, sailed for Paris this week to attend the show.

The National Automobile Company has been organized at Augusta, Me., to manufacture automobiles. Capital, $500,000. Officers: F. L. Fairbanks, president; J. Berry, treasurer.

The Syracuse Automobile Company, of 346 and 348 South Warren street, Syracuse, N. Y., has secured the exclusive agency for the Winton touring car for Syracuse and adjacent territory.

Kenneth A. Skinner, United States agent of the De Dion-Bouton Motorette Company, sailed for Europe Tuesday to attend the Paris show and arrange for a new exhibit at Madison Square Garden.

The Elmore Manufacturing Company are remodeling their shop and are putting in an additional boiler. In thirty days their new models will be out—a runabout similar to last season's and a touring car.

Secretary Unwin, of the N. A. A. M., proposes that exhibits at the coming New York Show, which are also to be displayed at Chicago the following month, be transported there on a special train and that the passage of this train be announced along the route by press notices sent in advance.

Tollgate Keeper Whittacker, of Eddystone, Pa., complains about automobilists; not that they do not pay, but because they never stop, and throw the money anywhere, with the result that it is sometimes lost.

Portland, Me., has fifty-two automobiles, forty-six steamers, four gasoline machines and two electric. Of the steamers fourteen are locomobiles, eleven Whites, five Stanleys, four Grouts, three mobiles and six special.

The Locomobile Company of America report that in the anniversary run of the Automobile Club of Great Britain and Ireland two locomobiles were awarded non-stop certificates, the only American car so honored.

The Bridgeport branch of the International Motor Car Company have in operation a $13,000 plant for storage and repair, open day and night. They have their own charging plant and now care for about forty machines.

Kenneth A. Skinner states that in his recent record run from Boston to New York and back the arrows placed for the Reliability Run by the A. C. A. proved a great help to him, and he hopes they may remain in position.

The A. C. A. has decided to adopt the recommendation of its contest committee to organize a contest of business vehicles next spring. It is said that John A. Hill will be president of the committee which will conduct this contest.

The Toledo Automobile Manufacturing Company, with a capital of $25,000, incorporated in West Virginia, was admitted to the State November 22. Calvin Parker is president, Charles H. Breyman secretary and George C. Picard treasurer.

Witherbee Brothers, 480 Massachusetts avenue, Arlington, Mass., are to open a new and more commodious auto station in the spring. The new station will have a charging plant for electric autos and complete facilities for taking care of steam and gasoline carriages.

The citizens of Felicity, Ohio, have organized an improvement club for the purpose of establishing automobile connections with one of the Scrugham traction lines. The officers elected are: F. Scott, president; S. F. Kennedy, secretary; S. F. Waterfield, treasurer.

Charles E. Miller, 97 Reade street, New York, has recently imported a lot of large French touring horns, fitted with flexible metallic tubing and with screens over the opening. The diameter of the bell is 8 inches and the tone is quite different from that of the average horn.

One of the most complete of private auto stables is located on Still street, Brookline, Mass. It is run by three Boston automobile enthusiasts, Messrs. McQuesten, Brown and Sheldon. There is a complete charging plant run by a small gasoline motor, and all the necessary handling a carriage in any sha trouble. Mr. McQuesten has and one steamer; Mr. Sheld electrics, a Pope-Robinson an Richard, while Mr. Brown has gasoline rig.

The German Court of App cided that the costs for the ex an automobile must be paid o lice budget, but that the op automobile must prove his p his own cost, according to the of the police department.

C. A. Duerr, of New York out the general agency for can" gasoline vehicles. His te prises the State of New Jer territory bounded by Hartf and Philadelphia. The Standa bile Company, of 136 West street, have become local age make.

For the Gordon Bennett C A. C. G. B. and I. has nomina pier vehicles and will hold an contest for the third vehicle o the Welbeck track. Upon ent of $2,500 is required, which is the vehicle does not appear this is to prevent "fake" entrie tising purposes.

The proposed ordinance to tomobilists in New York cit licenses had a hearing on N President A. R. Shattuck, of t and Joseph Oatman, of the Cycling Club, spoke in oppos ordinance, and J. B. Thompso A. W., who introduced it, i No action was taken.

The Beaconfield auto station circle, Brookline, Mass., rece combines the storage of horse hicles and horseless carriages. mobile department, in the building, has storage space fo hicles. There is a well equi shop on the same floor as the a new electric charging plant be installed.

William E. Jacques, of Det and Alfred C. Crozier, a capita New York last week to conf officials of the A. C. A. and p names have been mentioned in with special automobile roadw ing the "Jacques cement way," of two rails of concrete embe roadway, their tops approxin with the road surface.

Worby Beaumont is quote that the steel roadway was trie minster Bridge and elsewhere out any good results. The rid side of the track got a deal c tear from passing wheels; a disappeared the weight of the supported by the metal bed pressed the roadway and left th higher and more objectionabl fore.

MOTOR VEHICLE PATENTS..

United States Patents.

713,937. Brake Mechanism for Motor Cars.—Herbert Austin, of Erdington, near Birmingham, England. November 18, 1902. Filed April 23, 1902.

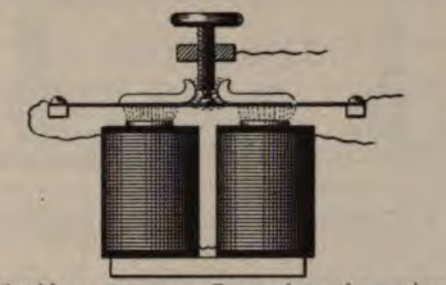
The object of this invention is to insure that brakes used in connection with wheels at opposite sides of a motor car and operated by a single handle will be caused to press with equal pressure against their respective wheels. The brake mechanism comprises two brake blocks at opposite sides of the car, a transverse spindle carried in fixed bearings of the car, and arms at opposite ends of the spindle which carry the brake blocks. One of these arms is capable of turning upon the spindle and the other is fixed thereto. Two arms extend from this spindle, one forming an extension of the arm aforesaid which is capable of turning thereon and the other fixed to the spindle. A compensating lever is pivoted at its centre to a part which is moved by the brake handle to put on the brakes, and links connect the opposite ends of this lever with the ends, respectively, of the second mentioned arms of the spindle.

713,983. Carburetor for Explosive Engines.—L. E. Heath, of Saratoga Springs, N. Y. November 18, 1902. Filed February 24, 1902.

714,020. Electric Interrupter.—Lars G. Nilson, of New York. November 18, 1902. Filed May 14, 1902.

The break is effected in a magnetic field to cause the magnetism to blow out the arc, thus securing a more rapid interruption of the current and preserving the contact points.

The vibrator spring is supported across the poles of an electromagnet, and arranged on the upper side of the spring are

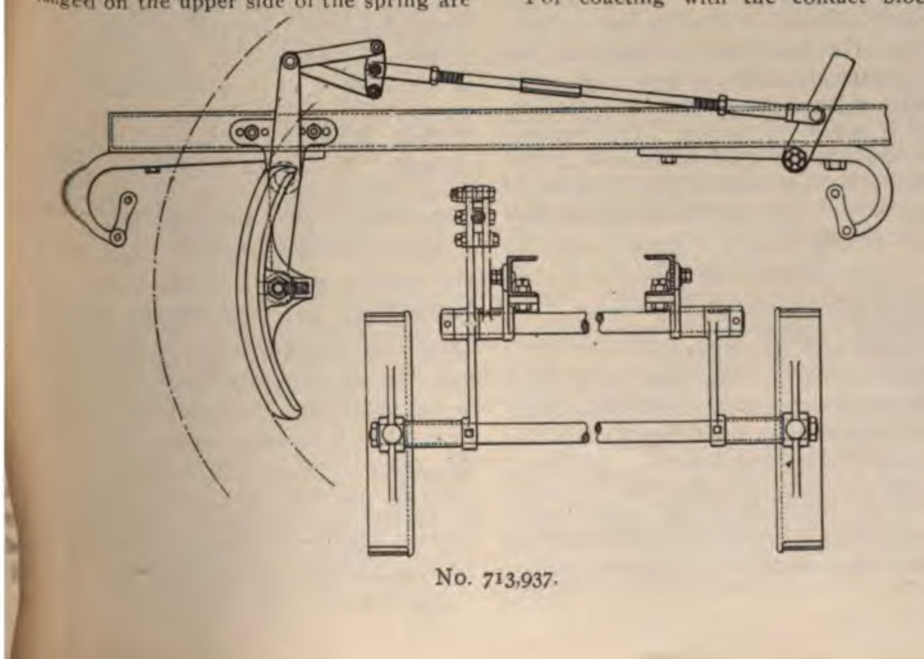


double armatures. Secured to the spring between the inner ends of the armatures is a platinum contact point designed to be engaged by a platinum point on an adjusting screw. It will be noted that the inner ends of the armatures are curved upward and that both contact points are wholly embraced in the enlarged field provided by so upwardly curving the ends. The point through the screw and its support is connected by a wire with the primary of the induction coil, the primary being also connected, by means of a wire, with the battery.

714,021. Controller for Electric Motors.—Lars G. Nilson, of New York. November 18, 1902. Filed May 15, 1902.

The controller is arranged within a casing and comprises a revoluble drum carrying contact fingers. This drum consists of a shaft having bearings in brackets attached to the rear wall of the casing and secured to the upper and lower ends of the shaft. Between the brackets are disks to which contact supporting strips of insulating material are secured. These strips are seated in notches formed in the disks. The controller can be made up for any number of speeds and any number of circuits; but in this particular instance it is shown as arranged for seven strips, intended for seven speeds—five forward and two reverse. On each strip a series of eleven contact blocks is arranged, the several contact blocks, of course, being spaced apart. Two blocks are used as terminals for supplying the current to the controller and eight for motor connections and one extra terminal for introducing a resistance.

For coacting with the contact blocks



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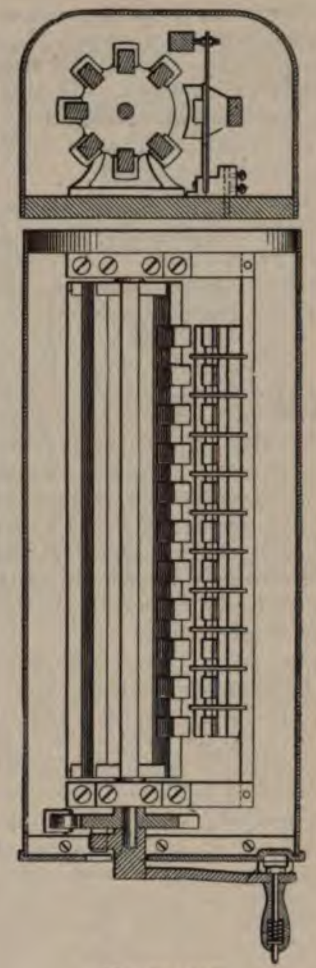

No. 714,021.

carried by the drum there are provided an equal number of contact fingers, each mounted on a spring yielding metal conducting strip, extended from a terminal block, and at the opposite end the yielding strip is engaged by a screw rod extended from a post, and nuts engage against opposite sides of the strip, so that the strip may be moved inward or outward to regulate the stationary contacts with relation to the movable contacts. This yielding plate consists of two strips, one of high electrical conductivity for carrying in the current and the other to serve as the spring.

The controller drum is held in the "full contact" positions by means of the usual arrangement of cam plate and roller.

713,674. Control Device for Driving Mechanism.—Charles R. Otis and Andrew M. Coyle, of Yonkers, N. Y. November 18, 1902. Filed October 7, 1901.

A controlling device for driving mechanism, comprising a rock shaft provided with arms, a rod movable relatively to the shaft, another rock shaft also provided with arms, one arm extending adjacent to the rod, and a locking device connected with the rod and arranged to co-operate with the arm extending adjacent to said rod.

713,494. Hydrocarbon Burner.—Frank A. Reynolds, Lewiston, Me. November 11, 1902. Filed June 10, 1901.

A non-active metal for use in and in

connection with storage batteries, and having the qualities of toughness, smoothness, resiliency and great mechanical strength in proportion to its weight, said metal comprising lead cast with substantially 12 per cent. by weight of antimony and rolled in a cold state.

712,999. Storage Battery.—Bruce Ford, of Philadelphia, Pa. November 4, 1902. Filed August 28, 1900.

A bead or flange formed by turning or folding the edges of a sheet of rolled metal is arranged with its axis in alignment with the plane of the support and insures even distribution of the active material on each face of the plate. The bead or flange imparts the requisite stiffness to the plate and is also useful as a guide in the application of the active material. It is much cheaper than a frame of rubber and much more easily made. If desired, suitable wires may be inserted in the flange at the corners of the plate, so as to strengthen them.

712,329. Engine for Motor Vehicles.—C. R. Pflaging, of Baltimore, Md. October 28, 1902. Filed August 4, 1902.

The object of the invention is to provide a steam engine in which the cylinders and the crank shaft are kept in the same relation to each other at all times; to dispense with the use of chains; to enclose the working parts in a dustproof casing; to provide means for throwing the engine out of gear when coasting, and to provide means for throwing the pump in or out. Sliding gears are employed for the last two purposes named. The drive to he rear axle is direct and the engine is not spring suspended.

713,792. Explosive Engine.—John A. Ostenberg, of Westminster Station, Vt. November 18, 1902. Filed June 1, 1897.

713,844. Device for Constructing and Curing Continuous Rubber Tires.—Michael A. Boylan, of Akron, Ohio. November 18, 1902. Filed July 22, 1902.

713,058. Roller Bearing.—Robert D. Camp, Chicago, Ill. November 11, 1902. Filed July 27, 1900.

713,147. Internal Combustion Engine.—William M. Power, Montclair, N. J. November 11, 1902. Filed December 27, 1900.

713,226. Vehicle Wheel.—George S. Lee, Hawthorne, N. J. November 11, 1902. Filed February 27, 1902.

713,351. Pneumatic Tire.—Charles H. Shepard, North Plainfield, N. J. November 11, 1902. Filed November 1, 1900.

713,366. Internal Combustion Engine.—Henning F. Wallmann, Chicago, Ill. November 11, 1902. Filed February 3, 1900.

713,367. Internal Combustion Engine.—Henning F. Wallmann, Chicago, Ill. November 11, 1902. Filed March 21, 1900.

713,375. Transmission Mechanism.—Henry C. Baase, Indianapolis, Ind. November 11, 1902. Filed January 28, 1902.

713,467. Driving Gear for Motor Cycles.—Donald MacDonald, Orroroo, South Australia, Australia. November 11, 1902. Filed June 28, 1902.

LEGISLATIVE AND LEGAL.

A Judicial Opinion on Speed Arrests and Fines.

On November 28, Ambrose Jackson, a colored man employed as washer of automobiles, was brought before Judge Dewey, of the Municipal Criminal Court of Boston, charged with driving an automobile at a speed (13 3-5 miles per hour) faster than the law allows. Jackson pleaded guilty, offering as an excuse that the machine was going faster than he thought it was, and was fined $3. In pronouncing the fine the judge said:

"I understand that it is the desire of the police department to make arrests so as to prevent abuse of speed, and it's the only way open at present. Some cases of this sort merit a very large fine, but it depends upon the rate of speed, recklessness and other circumstances.

"In fact, there are cases where I would be inclined to make the punishment more than a fine. But each case should be disposed of separately and should be tried on its merits.

"I don't want to be understood by this decision that it is what I intend to do in every case in the future. If this man was the owner of the machine, could afford to pay a big fine and had been found to be guilty of recklessness it would be different.

"I don't think when the Legislature made the maximum of 10 miles an hour that it meant or expected machines would not be driven faster than that on every highway. If this instance was one where a man was accused of driving a horse 9 mile an hour and the evidence was that the horse was a good one and was sent along without the driver thinking much about how fast he was going, I should impose a small fine. I think they are parallel cases.

"I see no reason why in every automobile case which comes before me I should impose a heavy fine, $25 or $50. In this case it would be wrong. The prisoner is a workingman, as I understand it, and whatever fine is imposed he will have to pay. Under these circumstances I think $3 big enough."

Harrisburg, Pa., November 20.—The automobile ordinance has been placed in the hands of a sub-committee.

Trenton, N. J.—The suit of Richard Siegman against the directors of the Lead Cab Trust came up for argument in the Court of Errors and Appeals last week.

Scranton, Pa., November 24.—Director of Public Safety Wormser today issued specific instruction to Superintendent of Police Day to enforce the ordinance covering fast automobile driving and to arrest all who exceed the speed limit.

Oconomowoc, Wis.—An automobile ordinance was passed here November 6 limiting speed to 6 miles an hour. Fine, $5 to $200.

Philadelphia, November 27.—The Road Drivers' Association and other horse interests are said to be making efforts with the City Council to have the speed limit in the pending automobile ordinance reduced from 10 to 7 miles an hour.

Lincoln, Mass., November 30.—Four automobilists were caught in the police trap here today and will be summoned to appear in the District Court at Concord charged with exceeding the municipal speed limits of 8 miles an hour.

Topeka, Kan., November 22.—The streets and walks committee of the council and the automobile owners of the city have agreed upon the terms for the proposed automobile ordinance. On the busiest streets of the city the speed limit is 8 miles per hour; on the other streets, 16 miles.

New York, November 23.—The automobilists who were arrested in Central Park last Sunday for not carrying initial plates on their machines were discharged today by Magistrate Mayo, who recommended the Corporation Counsel to bring civil suit against the defendents.

Boston, Mass., November 24.—G. E. Reed, of North Abington, was arrested here and fined $25 for exceeding the speed limit for automobiles. The officers who timed him claimed his speed was 12 2-9 miles per hour. This was his second offense. Reed appealed.

Yonkers, N. Y., November 25.—In fining Arnold Wood, of New York, $25 for automobile speeding Judge Kellogg said he admired Mr. Wood's frankness in admitting his speed, and his demeanor was different from that of other automobilists arrested for speeding in Yonkers. In other cases terms of imprisonment had followed.

Jamaica, L. I., November 25.—In the case of the chauffeur of Reginald Vanderbilt, for automobile speeding, Lawyer Schoonmaker claimed that the New York State automobile law is unconstitutional, as it provides that all fines collected from automobilists shall be turned over to the Society for the Prevention of Cruelty to Animals. He argued that it was illegal for any private corporation to receive any of the moneys turned over for fines.

Richmond, Va., November 22.—At today's session of the Legislature, when Mr. Churchman's bill regulating the speed of automobiles was called up, Mr. Whitehead moved to amend by making the speed limit 10 miles instead of 15 miles per hour. Mr. Kelley opposed the amendment. Mr. Whitehead spoke again, and the debate took a very amusing turn, much having been said about "machines" in Norfolk and elsewhere. Mr. Churchman advocated the rejection of the amendment, and it was lost. The bill was passed

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Speed Restrictions and Police Traps in Massachusetts.

The town of Lincoln, Mass., in the vicinity of Boston, some time ago reached the conclusion that it could improve upon the State law regulating the use of automobiles, and passed an ordinance reducing the speed limit in the town from 10 to 8 miles an hour. And since the ordinance itself did not have the desired effect of preventing occasional excessive speeding, a stretch for timing was laid off and a so called police trap installed which holds up all automobilists who are found to exceed the legal speed limit by the rather brutal method of stretching a rope across the road.

A number of recent arrests in the town mentioned have stirred up the automobilists of Boston and vicinity, and some dissatisfaction has been expressed with the present State law which allows local authorities to reduce the speed limit in their territory at will. Comparatively few communities have yet seen fit to avail themselves of this privilege, but the example set by such towns as Lincoln may be expected to be imitated in other places as long as reckless driving continues. The excuses of the speeding automobilists naturally engender feeling against automobilists as a class, and oppressive regulations have always been the result.

It seems reasonable to suppose that the residents of Lincoln and other towns would not object to a speed of 10 miles per hour, or even somewhat faster, if they really knew what such a speed amounts to and if they felt sure that this limit would not be exceeded. In every case where unnecessarily restrictive regulations have been adopted it has been not because it was recognized and proved that the existing speed limit was dangerously high, but because some automobilist would run at far above the speed limit, at speeds which appeared dangerous to the residents, and the latter decided that something must be done to stop this speeding The thing which is usually done in such cases is to reduce the speed limit.

It is pretty generally recognized that unreasonably low speed limits encourage reckless speeding. To judge by the tone of the public press, there is nowhere in the world a more pronounced feeling against automobiles than in England, the land of the lowest speed limit. The conclusion seems justified that there actually is more reckless speeding in England than elsewhere.

This fact ought to be impressed upon town councils who are inclined to pass excessively restrictive ordinances, that such measures will not remedy the real evil and will be an injustice to the great body of conservative, law abiding automobilists. It would be well if the automobile clubs of Massachusetts most interested would exert their influence with town councils contemplating a reduction of the speed limit fixed by the State law. Demonstrations of control and of brake power have often been found very effective with local authorities, and there is little doubt that in most cases councils would be open to reason and the objectionable ordinances could be prevented.

The most satisfactory way out of the difficulty, however, would be an amendment to the State law depriving local authorities of the right to reduce the speed limit in their territory. It is to be hoped that a bill will be introduced in the Massachusetts Legislature aiming to so amend the present law. And in the case of automobile legislation in other States automobile interests should insist on the minimum speed limit being established by the State and not by local authorities.

The Economy of Superheating.

We have recently received a number of letters as to the economical results that might be expected from the addition of a superheating coil to the common fire tube boilers of automobiles. A news item from the daily press recently reached this country from England in which it was stated that an astonishing increase in the mileage on one charge of supplies of American steam carriages had been made possible by the addition of a superheating device, the invention of an Englishman. We have, however, not seen anything about this device in the English automobile press.

Superheating is known to be a very important source of economy, particularly in small plants. The fact that it has not so

far been applied to any extent in fire tube boiler carriages would seem to indicate that there are certain difficulties in the way which have not yet been overcome. With the ordinary fire tube boilers the superheating coil would have to be placed either below or above the boiler. If placed below the boiler it would obstruct some of the fire tubes more or less; the coil could not be expected to last very long, owing to the excessive heat—except, perhaps if made of very heavy walled tube—and the degree of superheat would vary considerably, inversely with the steam consumption. If the coil was placed above the boiler there would be little or no trouble from any of these sources, but the degree of superheat attainable would probably not be very high. It will be noticed from the description of the Chelmsford steam car in this issue that this vehicle has a superheater in the space between burner and boiler.

It is plain, of course, that if a large economy is to be realized by superheating the steam must be superheated several hundred degrees at least. Too large a degree of superheat, on the other hand, is liable to result in cutting of the valves and in imperfect lubrication of the cylinders. Heavy mineral oil mixed with some graphite and introduced by a force feed lubricator is probably the best method of cylinder lubrication where superheated steam is used.

As to the probable economical effect of superheating, some idea may be obtained from the fuel economy of the White steam carriages in the Decoration Day 100 Mile Endurance Run. The fuel used per ton mile in these carriages was just about one-half that used in the fire tube boiler carriages. Now, as is indicated by Mr. Bickford in his article on flash boilers, high fuel economy is not an inherent virtue of this class of boilers. A tubular metal wall, under otherwise equal conditions, is not as efficient in transmitting heat when enclosing steam as when enclosing water. The economy of the Whites must therefore have been due (1) to the use of highly superheated steam, which increases the engine economy; (2) to the condensing system by which the feed water is maintained at the boiling point. Since many of the fire tube boiler carriages are equipped with feed water heaters which also raise the temperature of the feed water to about boiling point, the gain in economy arising from this source cannot have been very great, and the use of highly superheated steam must be looked upon as the chief reason for the high fuel economy noted.

Care in Reassembling.

In making repairs to automobile engines, whether steam or gasoline, the greatest care is necessary in reassembling the parts, to see that everything is put back in the correct position and that all adjustments are made exactly right. This point is well brought out in an article from a user, who, moreover, is a practical man and not a novice with engines, who in reassembling his steam engine forgot to connect up the link mechanism and started his carriage backward instead of forward, as the reverse lever was in the position corresponding to forward motion, but the links were in the opposite position when the throttle was opened. While with a steam engine such carelessness in assembling may become the source of a serious accident, similar carelessness with a gasoline engine may become the cause of the most annoying and puzzling experiences. We know of a case of this kind in which an engine after being reassembled gave only about one-half its normal power, and several days elapsed before it was found that in putting back the cam gears they had been put one tooth out, which altered the valve action to such an extent that the power was greatly reduced. What rendered the location of the trouble more difficult in this particular case was that a new design of carburetor was put on at the same time, and the loss of power was at first attributed to the new carburetor.

With gasoline motors particular care must be used with the igniter mechanism when reassembling the engine or when making any changes affecting the time adjustment of the igniter. In such cases, before it is attempted to start the engine, it should always first be ascertained that the spark occurs at the proper moment. As is well known to all operators of gasoline automobiles, when the spark occurs too early a back kick is produced in the engine, and if the spark occurs exceptionally early bodily injury may result to the person attempting to start the motor. This point ought to be particularly impressed upon operators of machines in which ordinarily the spark is automatically retarded in starting, since they need not pay any attention to the adjustment of the spark when starting under ordinary conditions.

The Advertising Value of Automobiles.

The advertising value of the automobile seems to appeal strongly to theatrical press agents at present, and among theatre managers and leading stage people many are now making use of motor carriages in their travels. The simple possession and use of an automobile is hardly a matter of sufficient importance, at this late day, to serve as the basis of a newspaper write-up, and only some extraordinary feat, an accident or narrow escape is likely to appeal to editors of the daily press as meriting notice in their columns. In this connection it has been observed that of the automobile accidents and narrow escapes reported in the newspapers recently an unusual proportion involved theatrical folk. The ball seems to have been started rolling, so to speak, last summer during the dull season, when the automobiles of a well known prima donna were first interfered with by the police and a few days later consumed by fire, which brought her name very prominently before the newspaper reading public for the time being. The press work in connection with this incident was excellently managed. The vehicles were assessed for the occasion at $18,000 and $9,000 respectively, and in connection with the fire the proprietress was described as having been cool, calm and collected, and having personally directed the work of the fire brigade.

Such unprecedented success in gaining free advertising through the medium of the automobile was bound to arouse a horde of imitators, and since that time there have been recorded many hair raising automobile experiences of tragedians and comical incidents of comedians. It is not well to attach too much importance to these, however, and it may yet become customary to meet the announcement that Smith or Jones has met with an automobile accident with the question: Does he belong to the profession?

Better Arrangements Wanted in Minor Contests.

The regrettable incident of incorrect timing in the Eagle Rock Hill climbing contest ought to be made the most of in impressing upon contest organizers that better management and better arrangements are needed than now obtain in most of the smaller contests. The error in taking the time of one of the contestants is

ly unpleasant affair for all con- could easily have been avoided wing rules had been observed: ie of the Mors timing device it ry to place the keyboard on a nd which the time keepers are The dial of the stop watch is ivenient view and there is little a mistake in reading the min- the other hand, when the ap- laced directly upon the ground s most inconveniently read, and of fact, the time keeper in the ed to in several cases gave out s at first, and upon closer in- found that he had read the ig. The device is designed for ble and a table should therefore l.

it is well always to have two time keepers. It is human to owance should be made for this time keepers reading the stop pendently are extremely un- th make the same error at the and any error on the part of n would therefore become ap- nce.

Drivers' Licenses Again.

onal Association of Automobile ers, it is reported, believes in ty of a national license law for operators, claiming that a fed- law would facilitate interstate ind would therefore be consti- n accordance with this belief ion has appointed a committee epresent it at Washington and troduction of a license bill in the earliest possible date.

re is no objection to this at- tain a national license law, we the chances of success are very factor in interstate commerce bile can command as yet very eration, and it will probably be convince Congress that this interstate commerce has be- fficient importance to require along these lines. It is to be at the manufacturers and Au- sociation differ in this matter, he automobile interests were a certain form of license, say , a license clause could be in- any future State auto legisla- od chances of its adoption.

her hand, if a national license ssibility it would seem to be preferable, as much tedious legislative work could be saved.

Vaporizer Losses in Gasoline Engines.

By A. E. Potter.

The matter of vaporizers in gasoline engine construction, both for marine and automobile use, seems not to have received the careful attention heretofore given to other details. It is my honest belief that at least 95 per cent. of the troubles with the ordinary two cycle marine engine is from vaporizers, which are almost universally used instead of carburetors, on account of cheaper construction and less cost.

There are two or three so called standard makes of seat feed vaporizers, while many manufacturers are using their own makes with modifications of the seat feed principle.

On carefully reviewing the conditions present in the ordinary two cycle motor we find many losses, some of which may be materially lessened if not altogether remedied.

The inlet of the explosive mixture into the crank space is regulated by the partial vacuum caused by the up stroke of the piston. If there were no friction of the gas, no "wire drawing" and no pressure left in the crank space from previous explosions, the cubical contents of each charge drawn in would be exactly the displacement of the piston. Now as there is some description of a check valve always necessary, either swing, tappet or ball, there must be a partial vacuum in the crank space to start with, which necessarily increases with the speed of the engine. Add to this the friction of the incoming gas, and the loss is increased. If, in addition to this, cylinder boring is imperfect, the piston is not true, leaks occur around the wrist pin, or the ends of rings do not meet, either one of which will allow the pressure from the firing chamber to enter the crank space, the amount of charge is again lessened. Back pressure from excessive muffling, too small ports, small exhaust piping, and too early opened inlet ports, cause pressure to remain in the firing chamber, hold back part of the charge, and also on the return stroke part of the charge is forced or drawn back, while part escapes through the exhaust ports, thus causing serious losses. Leaky check valves and vaporizers are quite frequently serious causes of loss, for reasons which are readily apparent when we come to study their construction. A satisfactory check valve of the tappet type usually has a narrow seat, while the ordinary vaporizer of necessity has a wide seat and has to be tight in order to give good results. To get such results is much more of a problem than one would at first suppose, without the necessity of using very stiff springs, which in turn increase wire drawing at the expense of efficiency of the engine. Many vaporizers I have found it impossible to grind satisfactorily except with new tappets, with stems fitting not so loosely in the guides. I have before now noticed, when carburetors were replaced by vaporizers, decided loss in power, and have, of course, rightly attributed this result to the increased vacuum required to lift tappet, with small area of opening, heavy spring, etc.

Tappets in this type are guided at the top or bottom end or both. The very instant a leak of gasoline develops a much larger surface is exposed to the head or pressure of gasoline, and unless guides and stems fit very accurately the tappet is upset slightly and the leak is increased. It matters not what the angle of the seat is. If too sharp the more trouble. This has been partly remedied by one manufacturer, at least, who makes his vaporizers ball seated: yet it is very rarely that they can be kept tight except with frequent regrinding.

That a ball seat is the only remedy seems reasonable, but a step further would appear to remedy the difficulty effectually. The radius of the circle on which the seat is cut and the tappet made to fit should be the distance from the face of the seat to a point midway between the upper end of tappet stem and the lower end of the guide. It will be readily observed that the tappet, even if upset, will under all conditions find a true seat. By this construction a larger opening can be used through the vaporizer, and instead of using a vaporizer one size smaller in the seat than the pipe thread, as is now the custom, full sized seat can be used. Lighter and quicker acting tappets will result in a decided increase in efficiency from lessened partial vacuum in the crank case. This change in construction ought to give from 5 to 20 per cent. increase in power and speed, and reduce trouble in operation of engines to a remarkable degree, and make the vaporizer troubles of automobile and marine engine operators considerably less.

Motor Power Formulae—Effect of Compression.

By L. Berger.

(Continued.)

Before applying the formula to particular cases we must examine the factors $b\ c\ d\ e\ f$. The factor b represents the proportion of heat of an explosion remaining after loss by radiation is deducted. In a jacketed motor the radiation will be mostly by the compression chamber wall, and will be proportional to the area of that wall. For a semi-spherical compression chamber the radiation will be proportional to $4\pi r^2$, or if v_1 is the volume of the semi-spherical chamber it will be proportional to $v_1^{\frac{2}{3}}$, For any other form of compression chamber it will be nearly the same. As the total heat of explosion for a given motor is proportional to the diagram area T, and that value in turn is proportional to

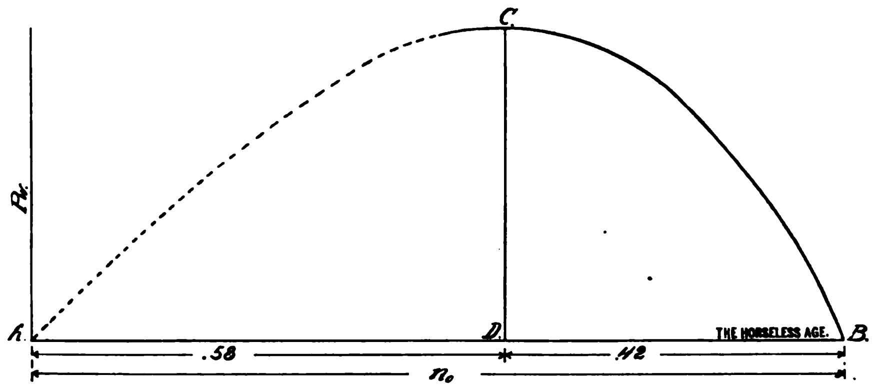


FIG. 1.—POWER-SPEED CURVE OF GASOLINE MOTOR.

v_1, we see that the loss of heat by the compression chamber wall will be proportional to $\frac{T}{v_1^{\frac{1}{3}}}$, and may be written:

$$\text{Loss of heat} = \frac{A\,T}{v_1^{\frac{1}{3}}}$$

The heat remaining after deduction of the loss by radiation through the compression chamber wall is therefore

$$W = T - \frac{A\,T}{v_1^{\frac{1}{3}}} \text{ or } T\left(1 - \frac{A}{v_1^{\frac{1}{3}}}\right);$$

hence,

$$b = 1 - \frac{A}{v_1^{\frac{1}{3}}}$$

The term c represents the fraction of energy remaining after deduction of the loss due to heating the incoming charge. We found that if the charge, which is admitted at a temperature of 15° C., is raised to a temperature t, so that its density is reduced from unity to $(273 + 15) \div (273 + t)$, the fraction of energy remaining in the mixture will be $(273 + 15) \div (273 + t)$, or

$$C = \frac{273 + 15}{T}.^*$$

The temperature T depends upon the mean temperature T^1 of the cylinder wall on the inside, during the suction stroke. For a given motor this temperature varies inversely with the loss to the water jacket, and it is therefore proportional to the heat remaining after the loss by the water jacket is deducted. Consequently

$$T = B\,T\left(1 - \frac{A}{v_1^{\frac{1}{3}}}\right)$$

and from this equation we find

$$c = \frac{289}{B\,T\left(1 - \frac{A}{v_1^{\frac{1}{3}}}\right)}.$$

* If T_o is the absolute temperature of the mixture before entering the cylinder; T the temperature of the heated mixture; T^1 the temperature of the inside of the cylinder wall, and T_e the temperature of explosion, we have

$$T - T_o = \alpha(T^1 - T_o) \text{ and}$$
$$T1 - T_o = \beta(T_e - T_o). \text{ or}$$
$$T = \alpha\,\beta \cdot T_e + T_o(1 - \alpha\,\beta).$$

and as α and β are smaller than one, and the product $\alpha\,\beta$ very much smaller, we have

$$T = \alpha\,\beta\,T_e + T_o;$$

and since $T_e = K\,T_o$, we have

$$T = T_o\left(\alpha\,\beta + \frac{1}{K}\right) \cdot \text{ and}$$

T is proportional to T_e and to $T\left(1 - \frac{A}{v_1^{\frac{1}{3}}}\right)$

From this we find for the product of the two factors b and c,

$$b\,c = \frac{289\left(1 - \frac{A}{v_1^{\frac{1}{3}}}\right)}{B\,T\left(1 - \frac{A}{v_1^{\frac{1}{3}}}\right)} = \text{constant}.$$

The factor d represents the energy remaining after the deduction of losses arising from the operation of the suction valve. If T be the spring tension and S the area for a given valve, we have

$$d = 1 - \frac{T}{S};$$

which is a constant for a given motor.

The factor e represents the proportion of energy remaining after deduction of the loss by throttling in the intake passages. If n_o is the number of revolutions attained by the motor when running free and n_1 the number of revolutions under normal working conditions,

$$e = \left(1 - \frac{n_1^2}{n_0^2}\right).$$

If we represent by A the power value of an explosion in a given motor, $A = P_w$, and we may write

$$P_w = B\left(1 - \frac{n_1^2}{n_0^2}\right).$$

As there are $\frac{n_1}{120}$ explosions per second the work done in the motor per second will be

$$P_w = B\left(1 - \frac{n_1^2}{n_0^2}\right)\frac{n_1}{120},$$

in the system of units in which B is expressed. This work for $n_1 = o$ is equal to zero, and for $n_1 = n_o$ is also equal to zero. The conditions making the power a maximum may be found by taking the first differential and equating it to zero, which gives:

$$n_1 = \frac{n_0}{\sqrt{3}} \text{ or } n_1 = .58\,n_0$$

The power P_w of the equation (1) is represented by the curve A C B of Fig. 1 for each value of n_1. This curve is quite similar to the one published in THE HORSELESS AGE of April 16, 1902, page 484, and the deductions which may be drawn from it are also in perfect harmony with the conclusions of an article in the issue of February 20, 1901.

If we know the maximum horse power of we can lay it off on a vertical line D C (Fig. 1), and if the speed of rotation, n_o, of the motor running free is known, the speed n, corresponding to maximum power, may be calculated by the equation $n_1 = 58\,n_o$. Further, the value of the horse power represented by D C permits of locating the point A. For maximum power

$$e = 1 - \tfrac{1}{3} = \tfrac{2}{3}, \text{ since } n_1^2 = \frac{n_0^2}{3}.$$

The factor f represents the fraction of the energy remaining after deduction of the loss by friction, and is of constant value.

From what precedes it is concluded that the energy of an explosion may be represented by the equation

$$P_w = v \times f(r) \times C$$

C being constant for any four cycle motor. The equation may be written more generally, to apply to any motor:

$$P_w = P_o\,v_1 \times f(r) \times C;$$

We will now examine the special case of a four cycle motor. For such a motor the volume of charge, v, is equal to C, and the power varies only with $f(r)$ and with r, γ and K, according to the three equations (a), (b) and (c), for different values of r. By means of these equations the following table has been calculated:

			$f(r)$ or T
$r = 2$	$K = 5.234$	$\gamma = 1.378$	$T = 6\ 786$
$r = 3$	$K = 6.942$	$\gamma = 1.387$	$T = 12\ 48$
$r = 4$	$K = 7.726$	$\gamma = 1\ 391$	$T = 17.00$
$r = 5$	$K = 8.17$	$\gamma = 1.394$	$T = 20\ 87$
$r = 6$	$K = 8.466$	$\gamma = 1.396$	$T = 21\ 36$

It will be seen from this table that the power of a motor of given bore and stroke varies directly with the compression, for ordinary values of the compression. This fact explains the very high power obtained from recent automobile motors, in which a high compression is employed and which have finely fitting pistons and piston rings. This deduction is of great importance, since account has been taken of every factor affecting the power.

For a four cycle motor we may therefore write

$$P_w = r \times v \times n \times a,$$

n being the number of revolutions corresponding to maximum power, and a a constant. If n is given in revolutions per minute and v in litres, we have

$$P_w = r \times v \times n \times 00002022,$$

the latter constant having been derived from the results of recent motor trials.

(To be continued.)

We have received a photo of the California motor bicycle, manufactured by the California Motor Company, San Francisco, Cal., which is claimed to hold the track record for vehicles of its class.

Mme. Sarah Reville, a woman of ample means, living at 90 rue Jouffroy, Paris, was recently sentenced by the police court to pay 10 francs fine and go to jail for one day as punishment for having driven her automobile at too high a rate of speed.—*New York Herald.*

ESSONS OF THE ROAD

liles in a Steam Carriage in a Hilly Country.

By B——.

:tter in last issue from "Steam " is to me most interesting; it ily be improved by having the f his different rigs given, though to guess at the makes of the two eresting, Nos. 2 and 5, both of take it, have the same name, iot the same makers. I have so reading the communications of at I feel moved to offer some of experience for your use, if you worth printing.

ie 3, 1902, I bought a steam car- the same make as the one I was g, but having the important ad- a condenser. Owing to infirm have used this carriage up to about 3,500 miles, and have done ng whatever, limiting myself to is of short radius, and to good ind road conditions; hence I have i the rig a severe test, and some alwarts of the brotherhood may as no test at all. However, this of country is so hilly, and the so poor, even when in their best t I think it is a great deal to be iy that I took between thirty and ntry trips during the five months, October inclusive, and never once get back home by my own power :r once was delayed enough to meal at home which I expected k in time for.

I doubt not, from past expres- your columns, there are readers at once set me down as a liar, e to believe that statement. Per- ay conciliate these by the further : that twice during the first 450 I was towed to the repair shop not by a horse, please note). I y enough to have these troubles hin city limits, and not out in a s, and since the last one, early in ave needed no towing. Further- these thirty odd country trips. I hink I was out of the rig more or eight times to do anything to le, and at least one-half of these ighten up the brake band, owing on our long, hard hills. Once a front spring broke, necessitating the nearest blacksmith to put t, which enabled me to run home a new spring would.

EVERY MISHAP IN DETAIL.

ot my intention to give the im- that I have had no trouble with age, and I now propose to name every mishap in the order in occurred, for I kept a close record of its performance all through. Troubles began with the very first trip on the day of purchase. I started from the station of the dealer from whom I bought, and ran about 20 miles over a park and boulevard system, when steam pressure went down in a manner which previous experience with the old non-condensing carriage of the same make had taught me must come from lack of water supply to boiler (this is of "semi-flash" pattern, and does not "burn" when water runs short). I closed the main burner valve from the seat, or rather tried to do so, but failed, as the knob revolved freely, with no result at the valve; so I jumped down, closed the valve by the other handle below and investigated. The knob at the seat is on the end of a vertical rod, at the lower end of which a pair of mitre wheels convey the motion to a horizontal rod connected by a slip joint with the stem of the valve. These mitres are held on rods by two set screws in the hubs, and one had been screwed too tight, and the hub split, so as to leave the mitre loose on the rod.

A glance at the feed pump on the engine showed why there was no water in the boiler—the stuffing box had unscrewed and all the packing was sticking out of the top, and a stream of water was flowing on to the ground by gravity, as the tank is above the pump, and water ran right through the inlet valve. As I was less than a mile from home, I did not attempt to repack the pump, but with the hand pump forced into the boiler enough water to run home, where I took out the pump and packed it, using the same hemp packing which had blown out; and let me add here that I ran that carriage 2,240 miles with that same packing before I threw it away and repacked the pump afresh.

As for the broken mitre wheel, I took one from the old carriage, which had not then been sold, and that mitre is still in use today, a new one having been procured and put in its place on the old rig. But that is not all the trouble of that first run. When I stopped to look at the pump I noticed the right rear tire was flat, and a glance showed it had "crept" enough to tear the valve out of the inner tube; so I just kept on home on the flat tire. I do not know when it went down, as I had not noticed any extra bumping on the smooth macadam roads. The tube was so much damaged by running flat that I could not tell whether it had first punctured and then crept or whether it began by creeping, and the tearing out of the valve let the air out. Anyhow, I lost all the next day with that tire, for the first new inner tube we put in split as soon as air was pumped into it, and the second did the same. The third tube stood up for several days, during which I ran only 80 miles, and then let go, and I lost the greater part of two more days taking off that same tire, and inserting new inner tubes. There seemed to be two troubles—the tubes themselves were poor material and the outer shoes had been made without any "flap," such as was used during 1901 in the same make of tires, and the tube pressing down into the space between the edges of the shoe was strained to the bursting point. Finally a tube was got to stand, and for a time tire troubles ceased; but immediately a new one sprang up.

THE PILOT LIGHT

took to going out, and I would have to get out and relight it two or three times in a 10 mile run. To try to prevent this I began to turn the pilot too high, hoping the stronger flame would continue to burn, with the result that I overheated the vaporizer in which the gasoline is turned to gas before going to the main burner, and which is just over the pilot light. I several times found this casting redhot after a stop, when no gasoline was passing through to keep it cool (the pilot has its own separate vaporizer), and knew this was bad, as being likely to carbonize the gasoline and cause a hard, cokelike deposit which would clog the passages of the vaporizer.

At this time, when the new carriage had run about 200 miles a jolt over a wrinkle in the asphalt pavement broke off an iron of one of the rear fenders, and the next day a front fender went the same way. These fenders were aluminum castings, held by wrought iron braces to the axles direct, instead of to the carriage body, and so got all the jolt of roads, unrelieved by springs. On this second breakage I had all fenders taken off, and have run since without them, as most other users of the same make of rig in this city are doing.

FIRST COUNTRY RUN.

The next day I took my first country run of 41 miles, being gone just three hours from home, and not being off the seat except to look into the water tank to be sure I had water to get back on. On the return I had about one-quarter tank of water left, though these carriages in endurance tests have run repeatedly 100 miles on less than a tankful. My carriage has never been able to show such economy of water, though it has often done better than above. This is, perhaps, partly due to our bad roads and hills, but chiefly, I think, to leaks in the condenser, which I have not taken the trouble to stop, because I am always able to run a half day on a tank of water, and where I stop for a meal I can always refill the tank with little trouble.

The very next day the fire was so weak and steam so poor that I doubt if I could have made that country trip (one instance of my great "luck"), so I concluded the vaporizer needed cleaning, and rather than go to the labor myself I ran the rig to a repair shop and told them to clear out the passages. This vaporizer is a casting, perhaps 10 inches long, having four one-quarter inch holes through it lengthwise, with cross passages connecting, all ends of holes being closed by machine

screws except the end ones, in which are pieces of pipe, one terminating in the nozzle which injects the gas into the mixer of the main burner, while the other connects by a union to the burner valve. Thus by breaking the one union, this vaporizer can be taken out and a new one substituted, and I now always carry a spare one, just as our gasoline friends carry extra spark plugs to substitute when one fouls. At above date, however, I had not learned to be so provident, and four days later, after only a total of 400 miles for the carriage, and about 60 miles from "cleaning" of vaporizer by the shop, it plugged up so solid that no gas at all could get through to the burner, and for the first time I was left helpless on the road, and had to ask for a tow rope and be

HAULED TO THE SHOP.

An expert from the factory happened to be in town that day, and he attributed the trouble to the use of 68° gasoline, though I had used the same in the old carriage without such experience. Anyhow, I took his advice, and have stuck to 76° fuel religiously ever since. He went over the whole gas line, including the pilot, but next day the latter went out again, the same as before, though the "low test" gasoline had been removed and carefully cleaned out. It was then decided that the pilot was defective,and it was returned and a new one supplied, free of charge, which, while it has occasionally gone out, does not do so once in six weeks.

At this time I also had a casing put around the burner to prevent "backfiring," which had at times been rather annoying. The old rig, having draught from exhaust steam to help the fire, had never once backfired in my experience, but, of course, with a condenser there is no exhaust to create draught, and in windy weather the burner still at times gives a little annoyance, though it cannot be called "trouble," for it generally takes care of itself and blows out of its own accord.

BALL JOINT BREAKS.

I find I have omitted one experience in its regular place. On the ninth day after purchase I was riding along the city streets when steam fell in the same way as on the first trip. I had put a wirekeeper on the pump stuffing box to prevent slacking back, and a glance showed this was in place. Thinking a valve might have stuck, and would presently clear itself, I used the hand pump, and went on, only to have steam again drop below 50 pounds. I then got out and looked at the pump, but could see nothing wrong. The plunger was at the bottom of the stroke. I pushed the carriage a little, so as to move the engine and pump lever, when the rod came up out of the plunger, leaving the latter down! The ball joint at the bottom of the rod had broken off. I ran to a shop, about 3 miles away, by use of the hand pump, and bought and put in myself a new plunger.

NEEDLE VALVE TROUBLE.

My next experience was on a short ride on the evening of July 4. While running I tried to shut off the main burner valve, and found it would not stop the flow of gasoline. When I reached home I put out the fire by means of the valve near the gasoline tank, and left it until daylight to investigate. I then found that a small wire which projects from the point of a needle valve, for the purpose of keeping clear the passageway, had broken off, and getting between the point of the valve and its seat had been pressed into both so as to make a leak there, even after it was removed. As there was no way to keep this leakage from dripping out and igniting while the pilot was being heated up, it was impossible to raise steam, and for the second (and so far last) time I had to ask for a tow rope and be pulled to the shop, where a special tool was made to ream out the damaged seat, and a new needle valve put in, from which I took care to break off that wire and throw it away before it could do any damage. I have run over 3,000 miles since without missing it.

TIRE EXPERIENCE.

About a week later the makers of my tires appeared in town with the offer to cement flaps in all shoes, which I accepted, though the front tires had given no trouble, and for nearly a month the rear tires also had stood up, and after putting in flaps no trouble was had with any of them. I find I have again left out of proper order some of my tire troubles with the other rear wheel. It went the same way as the first one, and after putting four inner tubes into it in one day, I put on a spare shoe left from the old carriage, which had a flap in it, and which gave no trouble until it wore entirely out, in about 1,100 miles' service. As the other rear tire ran 2,800 miles without any sign of such wearing out, I can only assume that this shoe was poor quality. It had been sent me free, as a replacement for a shoe which was defective, and possibly to save strain on their generosity the makers had given me a "second" quality tire.

On July 22 I was running along the "speedway" with so much steam pressure that I partly shut the throttle for safety for, I think, the only time in my experience when on a plain straight level reach of good roadway; yet before I had gone one mile further steam was all gone, and the fire was nearly out, owing to that vaporizer again choking up with carbonized gasoline. I went to the pumping station of the city water works, close at hand, to telephone for aid, but a clerk there offered assistance, and one of the engineers went out with me and between us we took out the vaporizer and cleared it enough to run home, where I myself finished the job. And let me say it was as hard work with a breast drill as I want to undertake to get that flinty deposit of carbon out of the passages. after this experience that I procur spare vaporizer, which I have ever carried constantly in the rig, but needed it on the road.

After 1,900 miles more a stuffing b stripped its thread on cleaning the of the nozzle, and I then changed spare vaporizer, and had the ol cleared out, and a new nut put on.

LUBRICATION.

We had been having a very rainy up to the first of July, and roads we so until near the end of that month no more country runs, but through and September they were numerou the first, a 40 mile trip over some should like to show the Eastern end run promoters, the hand oil pump, by the cylinders are lubricated, got condensed steam, owing to a valve l and on the last part of the trip I co little or no oil into the cylinders, caused me much anxiety at the though no harm was ever apparent f Would any gasoline motor have esca well? A few days later there was sound of the exhaust of the engine the outboard valve was closed, and greatly puzzled until another facto pert located it for me in a lost scr attaching the engine casing. This was tapped directly into the exhau sage on the back of the cylinder in a most inaccessible place, and alm volved taking out the engine to repl but that was avoided. This same was able to help me with my oil which repeated its former act, and an arrangement which has prevent trouble of that kind since.

SPRINGS.

About the middle of August I be find the air pressure gone from th tank after standing over night, and located the leak at a union on th copper pipe leading to the air gauge. was soldered, but had to be done few days later before a good jo made. Up to August 25 I had fro to time tightened stuffing boxes of rods and valve stems, but at that found the nuts about home, and afte ning over 1,800 miles I put two ri asbestos packing (vulcabeston) in eac This was the first packing added an about the engine. Three days later I a leaf in a front spring, already r to. The rear springs of this carria protected with rubber buffers, and this breakage I put two chunks of gu the front springs also, which have tually prevented any further breaka think this should be done on all the of every vehicle used for country and believe it would entirely end breaking.

THE CHAIN.

When I had the rig in the shop new leaf for that spring I took th off for the first time for cleaning, the

n showing 2,044 miles, and I e loose plate of the coupling link tched until one rivet hole looked yhole. Why it had not broken on the hills it had pulled up I can The chain on the whole seemed shape, but I decided to take no put on an entirely new one. Unr I should have done better to d the chain taken off and well wo or three times in running that At this time I had new leather ie brake band for the first time, cce of rubber tube from the conımp to the filter in the water tank. r had been burned by fire blowing ough the burner in windy weather, d have lasted longer, as there is ssure on it.

BRAKES.

might mention that this pump, of the same stroke as the engine, ectly connected to the crosshead, yet been repacked or touched in except the stuffing box screwed very little at long intervals. The ither was quite burned out, and y lasted a long time considering ce, for our long hills, sometimes hard pressure on the brake for ile at a time, give no chance to d render two entirely separate real necessity, which I had im- n me about this time so forcibly ok steps to apply a second brake, was a full month later before I

ptember 8 I was returning from ioon in the country when the ldenly went down to 50 pounds— gn of lack of water in the boiler. d pump seemed full of air, so I got out and looked in the tank, to rfectly dry. A wet streak under n an otherwise dry street, showed le instantly, for a pet cock on the r was wide open, and through it water had departed. This had ore showed such a tendency, and know what caused it or when it out all the water had escaped in ess than 30 miles' running. Of water could reach the cock ex- ie shape of exhaust steam coming the engine, and a tank of water run about 25 miles, even on those s, and with no condenser, so it is g how it all escaped so quickly. I rubber bucket in the laundry of st house, poured it into the tank, a few strokes by hand, turned on r and went home. Where would e boiler have been under the same nces?

next few days I had poor steam ime, which would be improved ie I used the hand pump to put ore water into the boiler, showing not getting proper supply. I o the conclusion that the empty- e tank that day had allowed what t have escaped the filter and reached the tank to get down to the bottom of same and clog the strainer, so I took it out and cleaned it, though not showing any need. Water feed not improving I went to the shop, where they at once suggested the real trouble. The automatic bypass, which is opened by a diaphragm when the steam reaches 220 pounds, passing water back to the tank until the steam falls again, had become leaky, and it had to be taken out and the valve ground in. This made it all right, and I had steam in plenty.

A ROCK IN THE ROAD DOES DAMAGE.

Two days later I made a 93 mile run in three different States, and in West Virginia a rock in the road caught that same condenser pet cock, and broke off a nipple which formed also the connection back to the pump on the engine for returning the condensed steam to the water tank. The water was thus all lost, as steam passed through the engine, and I had to refill the tank twice on the way home. Aside from this day, and the case above mentioned, there were only two other trips up to date on which I had to, or did, renew my water supply while away from home. The next day I found I could remove the broken end of the nipple from the condenser header by driving into it a cold chisel which forms part of the regular tool kit of the carriage, so if I had only had a spare brass nipple with me I could in a few minutes have made good the damage, and saved the labor of filling the tank twice with a bucket. I also discarded that pet cock, substituting a plain plug, which gives about three-quarters of an inch more clearance for roadway, and is not liable to be knocked open unintentionally. I also found room for two more rings of packing on the piston rods. This was at 2,645 miles' total, or about 820 since the first packing.

POWER AIR PUMP.

About this time I had a lot of trouble with the power air pump, which had previously been a great comfort. I put in several new leather washers on the piston, cleaned all valves and passages, put on new rubber tube to the fuel tank, and finally threw away the pump and bought a new one, but still it does not work like the original, and needs to be in almost constant use to keep up pressure. Have found no one who can explain the difficulty. This pump is of the kind hung on a trunnion, and swung into engagement with a pin on the engine crosshead by pressing a foot pedal.

WHEELS AND TIRES.

When the rig reached 2,800 miles, near the end of September, I threw away the entire set of wheels and tires, though the latter had then run several months without any trouble, and only one wire spoke had ever broken (that one was on the inner side, like those of a recent correspondent of your paper, and like him I had to take the wheel off the axle to get the new spoke in), and put on new tubular wheels, which had been making for some time, fitted with single tube tires, and—most important—brakes on the hubs, which are operated by a hand lever provided with ratchet for locking same. At this time I found it necessary to again renew the leather on the regular brake on the differential. I have now two independent brakes, and on long hills can change off, using one while the other is cooling, and so keep both in good condition. I will say here that these new tires have been run to date a distance of 700 miles without puncture, and without the pump being put to any one of them.

Two or three days after getting on the road again the sharp barking of the exhaust showed that a second screw of the engine casing had dropped out, leaving an open hole into the exhaust passage, and I had to go to the shop for a new one. The following week a knocking in the engine, which had been very gradually developing, compelled attention, and the engine was taken out of the carriage for the first and only time so far, and one or two broken balls were found in one of the crank shaft bearings. The rig had run just over 3,000 miles without any attention to any bearing of the engine, except one connecting rod end, a capscrew of which had several times loosened, owing to its set screw having stripped the thread in its very shallow hole in the side of the connecting rod cap. As there was no room to get in a good setscrew I threw away the capscrews and put in studs, with nut and jamnut on each. As the capscrews had round, "screwdriver" heads, which were countersunk into the cap of the rod, it was necessary to make the nut of each stud of "bottle-neck" shape to seat in the countersink, with projecting head of hexagon shape for wrench.

That completes my list of troubles and repairs, the 500 miles run since having been without any annoyance of any kind. Collected together it looks like a good deal of trouble, but scattered as it was through six months it was far from burdensome; and as said at the start, none of the trouble occurred at a time when I was out of reach of help. The first tow would have been avoided had I then carried a spare vaporizer as I do now, and the second also had I run at once to the repair shop, as that break did not stop the making of steam, but only prevented firing up after once getting cold. Of course I was lucky in not having certain things occur when out in a wilderness of bad roads instead of on a city boulevard, and in nothing more lucky than my total freedom from tire punctures, which may come at any time. In three years' use of motor vehicles I have not yet punctured a front tire. The first year I had one rear puncture; the second year none at all; this year in March on one trip into the business part of the town I got two nails in one rear tire and one in the other, but have not picked up anything since worse than a few

tacks, which did not reach through the outer layer of the rubber. It is only fair to state, however, that I have had several different carriages, selling one and buying another as improvements developed, and that in changing wheels this year I changed tires also, so that I have not run any set of tires more than 2,800 miles. Also that I have had other troubles than punctures, as enumerated above.

ADVOCATES LIGHT OR MEDIUM WEIGHT CAR.

This is written, not for men who have been in the game longer than myself, but for those who are contemplating entering it, and to such I would say that when they read of the great trouble and expense such and such a one has had with tires, just notice whether his rig is a heavyweight or one of the light or medium class. One of your correspondents recently expressed doubt of the truth of others who claimed to have less trouble than he, and could not see why a tire repair, which cost him $4, would cost another man less. He does not seem to remember that while his tires are 36x4½ inches the others may be only 28x 2½ inches, and that the latter will carry a runabout with immunity, where the former may not carry a touring car without destruction. Unless a man positively must have room to carry more than two passengers, I hold that he will do far better with a car of medium weight, or lighter, for any use, city or country.

COUNTRY RUNS.

Let me finish by bearing testimony to the great enjoyment to be had from country runs, even if one is not able to go on extended tours, and has not roads of European excellence within reach. Of my thirty odd trips the past summer, only six were more than a half day in length, the others, ranging from 28 to 50 miles distance, being made in a morning or afternoon without once missing a meal at home, and each time I came back from these short runs untired, though weak in health, and in a state of mental exhilaration and delight. The country roads, when dry, are not so bad, and far more interesting than a straight streak of macadam, and the country horses are not half so scary as I was told. If a man is disposed to treat their drivers fairly, he will find himself treated just as fairly by them, and, while I have been sworn at perhaps a half dozen times, I have been thanked for my consideration by drivers of nervous horses times without number. Things seem pretty well balanced on the whole; when you meet a badly frightened driver, he nearly always has a horse which will not look at your rig at all, and the worst scared horses are generally driven by men who take it coolly. As for your own rig, it is of course necessary to keep it in proper order and to learn enough about its construction and operation to be able to make ordinary adjustments, and if you have a steamer there will be no mysterious stoppages of the engine the cause of which must be found before it will run another inch.

Automobile Delivery in a Grocery and Provision Business.

By E. W. Darrell.

I have been much interested in the numerous discussions regarding the economy of autos as compared with horses, and should like to present my views on the matter.

Having a flourishing grocery and provision business, necessitating a large amount of "quick delivery," the problem of covering the territory several times a day becomes one of no small moment.

We had always kept at least six horses and quite often seven, at an average cost of $5 per week for each horse.

STARTED WITH A QUAD.

After a great deal of thought, I finally (as an experiment) purchased a motor quadricycle, equipped with a 2¾ horse power motor, and weighing 360 pounds. This machine has a bicycle saddle amidships for the operator, and a large comfortable seat (for one only) in front. It was bought fifteen months ago and has been in constant use ever since. It is used from 7 a. m. to 10:30 a. m. for the collection of orders, and from then till 6 p. m. for the delivery of special, "rush," and the more scattering orders. To use it for delivery we simply strap a large box in the front seat and by so doing can easily carry up to 200 pounds weight. During the year and three months we have had it we find it to cost approximately 1¼ cents per mile as per appended schedule. It has been out of commission for various reasons on an average of four days a month, principally on account of heavy snow and extremely wet weather. I wish to say here that our greatest trouble has been from short circuits during rainy weather, but which I think we have now avoided by using a different system of wiring and housing in the induction coil.

Our principal repairs have been four exhaust valves, at $1.25; one piston and rings, $8; connecting rod, $5; crank pin, $4, and a forging (ran into tree), $2.

The quad covers an average of 35 miles a day on week days, and almost every pleasant Sunday or holiday my wife and I have taken long trips out into the country or to the neighboring towns.

I have several times covered the distance from Providence, R. I. (44.5 miles), in from two hours to two hours and fifteen minutes, and last July I took a trip to Waterville, Me., and back (a distance of 500 miles over the meanest roads imaginable), with absolutely no trouble, barring a broken exhaust valve (twenty minutes) and a broken battery connection (twenty-five minutes).

A HEAVY GASOLINE CAR ADDED.

This little machine displaced two horses and proved to be such an all round success that last March we bought a second hand '99 model gasoline car of well known make, and, at a cost of $40, had a panel top made with a second deck. This top can be placed on by removing the r seat, and vice versa, in about fiftee utes. We use this auto for deliver on the principal routes. It has pro be even more of a success than the machine, and its repairs to date co a differential gear frame, $15; pini spokes, $1.50; rear tire, $28, and tw tires at $17 each.

It works perfectly in all kinds of w consuming a gallon of gasoline to e miles and a vast amount of oil. As no case for transmission gear, it fully 80 per cent. of the oil.

In regard to horses, our experien been that to use the same horse a six days a week, means a dead hors months, so we figure to use each two full days and four half days eac and by so doing we find they can s about three years, at which time, by no means played out, they a longer suitable for our business.

Both machines are used all day an ly every day, and we now keep onl horses, although on five or six oc we have found it necessary to hire a horse for the day.

Not having kept as close track o ating expenses of the automobile, not attempt to give any figures exc the quad:

One gallon gasoline sufficient miles.

One gallon cylinder oil sufficient miles.

One set of batteries sufficient miles.

Front tires sufficient for 13,000 mi

Rear tires sufficient for 4,500 mile

EXPENSE FOR TWELVE MONTHS.

300 gallons gasoline at 10 cents...

23 gallons oil, at 75 cents.........

Eighteen sets of batteries, at $1...

Five tires, at $9.................

Repairs ....

Total ....

Total mileage for year, 13,500 mil

It is only fair to say that our ro fairly level and of the best.

In conclusion, I should like to s I most emphatically differ from th of many of your correspondents as unfair and extortionate prices at stations and machine shops. Aft chasing our first machine I soon fo that to buy a new part at the fact an expensive operation.

I find that I can go to almost a chine shop and have spare parts m order (even where they have no f for that sort of work) for about cent. of what the manufacturers ch can hardly conceive why this shoul it certainly seems to me that the m turer should at least make it an o keep his own machines in repai small a cost as possible, while as am concerned their motto seems "He's got to have those parts, s him."

VEHICLES AND PARTS.

lopkins Gasoline Runabout.

Hopkins, 143 West 103d street, New y, has built and intends to manu- light gasoline carriage with piano y, of which a photo is herewith The carriage, which weighs com- pounds, is propelled by a single vertical, two cycle engine of 1¾ ower. The engine has a bore of es and a stroke of 3½ inches, and nning free it attains a maximum 1,000 revolutions per minute. The n power is obtained at a speed of 700 and 800 revolutions per

engine has two flywheels, each 30 pounds. Its total weight is nds. It has electric ignition, the eing operated by the piston. The for ignition is furnished by a set dry cells for starting. After the has run up to speed, an automatic connects the ignition circuit to a enerator. The latter is of such that it furnishes enough current te two electric side lights of six power each, without affecting the The engine speed is controlled rottle valve, which admits of re- t to 170 revolutions per minute. hange gear gives two speeds ahead The power is transmitted from the haft to a countershaft by means of the two sprockets having nine and wo teeth respectively. Two separate are provided for transmitting the rom the countershaft to the rear axle. sprockets corresponding to these ins are loose upon the countershaft, each be fastened thereto by means ction clutch. The sprockets cor- ing to the high speed have ten and wo teeth respectively, and the s corresponding to the low speed d thirty teeth respectively. e controlling devices are grouped rtical standard outside the seat on t hand side. The main lever on ndard controls the steering gear; what smaller lever the friction clutches, and a third lever, connected to a rod passing up through the centre of the standard, the engine throttle. Another rod comes up alongside the standard, this rod controlling the gasoline needle valve. This needle valve is said to be so arranged that the engine cannot possibly be flooded. After it has been set, it can be clamped in place, so that the adjustment will not be altered by the jar on rough roads. The body of the carriage supports only the gasoline and water tanks. The gasoline tank has a capacity of 5 gallons, and the water tank a capacity of 4 gallons. All the machinery is supported upon a special angle iron frame on the running gear. The latter is of the standard steam carriage tubular type. The engine and transmission shaft bearings are bolted down to the angle iron frame, which is fastened to the rear axle at two points, on opposite sides of the differential gear, and to the front axle in the centre. The body is supported on a transverse full elliptic spring in front and two full elliptic side springs in the rear. The track of the carriage is 4 feet 6 inches, and the wheel base 4 feet 10 inches. The wheels are of the wire suspension type, 26 inches in diameter, and shod with 2 inch pneumatic tires. The carriage has a spindle seat.

Mr. Hopkins states that he has used the carriage for two or three months, in which time he has covered about 1,000 miles. A maximum speed of about 18 miles per hour has been attained on the track with one man in, and the vehicle is said to be very efficient in hill climbing.

The Holley Gasoline Runabout.

The Holley Motor Company are putting upon the market a gasoline runabout minus body—a chassis, as the French would say—as shown in the accompanying cut. The motor is of the De Dion type, with single vertical cylinder, aluminum crank case and inclosed flywheels.

The running gear is of the flexible reachless style. Radius rods run from the rear axle to the angle iron frame. The track of the running gear measures 45 inches, the wheel base is 64 inches and the wheels are 26 inches, equipped with 2½ inch Dunlop detachable tires. The width of the angle iron frame on top is 28 inches and the length 64 inches. The rear axle is 1⅝ inches in diameter and the front axle 1½ inches. The sprocket on the rear axle has thirty teeth. The compensating gear is enclosed and provided with a band brake on the outside.

The transmission is said to be of simple and substantial construction throughout, and has been given practical road tests on the demonstrating rig. It consists of two individual clutches and weighs only 25 pounds. It is enclosed, the gears run in oil and are in mesh at all times. The teeth of the gears are claimed to be of ample proportions, making it impossible to strip same. The cap of the transmission covers the whole top, and can be easily removed by turning one thumbscrew. The transmission has two speeds forward only, which are controlled by one lever. A backup can be added. The carburetor is of the float feed type.

Russell Gasoline Carriage.

The Russell Motor Vehicle Company, of Cleveland, the incorporation of which for $1,000,000 in Arizona we mentioned recently, announce that they will bring out in the spring a gasoline vehicle equipped with a self starting multi-cylinder engine. The entire motor equipment, with the exception of the tanks, is built integral with the motor and is dust proof and self lubricating. A one-half horse power electric generator is direct geared to the engine and furnishes current for sparking the engines as well as to light three 8 candle power lamps—two front lamps and one extension lamp with cord attached, which is concealed under the seat. One of the features of the vehicle is an igniter which times itself automatically, operates two cylinders and dispenses with induction coils. The change gear has two forward speeds and one reverse; it is enclosed in the crank case of the engine and runs in oil. The vehicles are controlled entirely by two levers; the steering lever and a lever situated on the left side of the seat. The direction of the movements of these levers indicate the direction that the ve-

HOPKINS GASOLINE RUNABOUT.

THE HOLLEY GASOLINE RUNABOUT.

hicle is intended to take. By a forward movement of the lever on the side of the carriage the engine is started, and a further movement in the same direction throws the engine in gear with the vehicle on the slow speed. The continuation of this movement in the same direction throws the engine in gear with the vehicle on the high speed. The vehicles are reversed on the slow speed by moving the same lever to its extreme back position. The vehicle is equipped with chainless transmission.

The Prospect Gasoline Carriage.

The photo herewith illustrates a gasoline carriage built by Wottring Brothers, of Prospect, Ohio. The weight of the complete vehicle is 1,050 pounds. The engine is of 6 horse power and the change gear gives two speeds forward and one reverse, it being entirely controlled by one lever. By means of the ignition control lever the speed of the carriage can be increased to 30 miles an hour, it is claimed. The body is provided with a collapsible front seat and the vehicle will carry four persons if required. The muffler is claimed to be exceptionally efficient in deadening the noise of the exhaust.

The Cadillac Gasoline Runabout.

A new gasoline runabout has recently been placed upon the market by the Cadillac Automobile Company, of Detroit, Mich. An illustration of this vehicle is shown herewith. The vehicle is of the runabout type, but is probably somewhat heavier and stronger than the average representative of this type.

The body frame—the vehicle is reachless—is built up of angle steel and is supported by semi-elliptic springs in front and rear.

THE CADILLAC GASOLINE RUNABOUT.

The axles are fitted with "American" ball bearings. The vehicle is equipped with standard compression wood wheels, using deep steel channels fitted for single tube tires 28x3 inches. Either Hartford or Fisk tires are furnished.

The motor is a single cylinder, horizontal one of 5 horse power, with cylinder and head integral, thus avoiding gaskets. It is built by the Leland & Falconer Company. The bearings have bronze bushings of liberal wearing surface. The bearings on the crank shaft and crank pins can be removed without taking the shaft from the engine frame. The cylinder is detachable from the frame and all parts of the motor are interchangeable. The ignition is electric and a device is fitted making it impossible to start the engine while the spark is advanced, thereby avoiding accidents. The engine is water cooled, the water being passed through a single section coil of twelve seamless tubes five-eighths of an inch in diameter, over which are slipped copper radiating disks, three-eighths of an inch apart.

The speed of the engine is controlled by means of a throttle, the throttle lever being located on the steering post.

The muffler connection is fitted with a cut-out for use on country roads, where noise is not objectionable.

The carburetor or feeder is claimed to be one of the special features and to require no adjustment for any variation in speed or atmospheric conditions.

The transmission is of the planetary type, the pinions and gears being of steel and bronze respectively. All parts of the gear run in oil, and oil needs to be fed through one oil hole only. A Brown-Lipe equalizing gear is used. Brake drums are fastened to the two halves of the driving axle and the objections to the ordinary differential gear brake are thus avoided.

The steering is effected by means of an inclined hand wheel and an adjustable irreversible mechanism.

THE PROSPECT GASOLINE RUNABOUT.

The Vogel Single Acting Steam Engine.

The illustrations herewith show a vertical single acting, triple cylinder steam engine for automobiles designed by Chas. Vogel, of Fort Lee, N. J., and exhibited by him at the last Madison Square Garden Show.

The engine is a 6 horse power, it being claimed to develop this power at 400 revolutions per minute when running on 150 pounds steam pressure, with the cutoff at one-quarter stroke. The speed can be increased to 1,500 revolutions per minute. The cylinders have a bore of 3 inches each and a stroke of 3½ inches. The weight of the engine complete, with all castings of iron, is 95 pounds.

The cylinders are cast in a single piece and bolted down to the crank chamber. The crank shaft is a three-throw, with cranks set at 120 degrees with each other. It is forged flat and is then twisted to bring the separate cranks into the correct

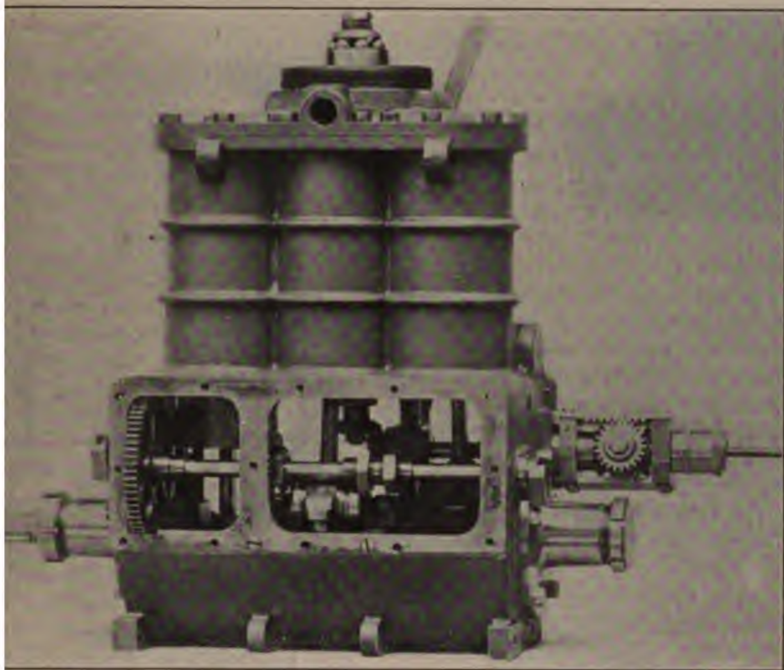


FIG. 1.—VOGEL THREE CYLINDER, SINGLE ACTING STEAM ENGINE.

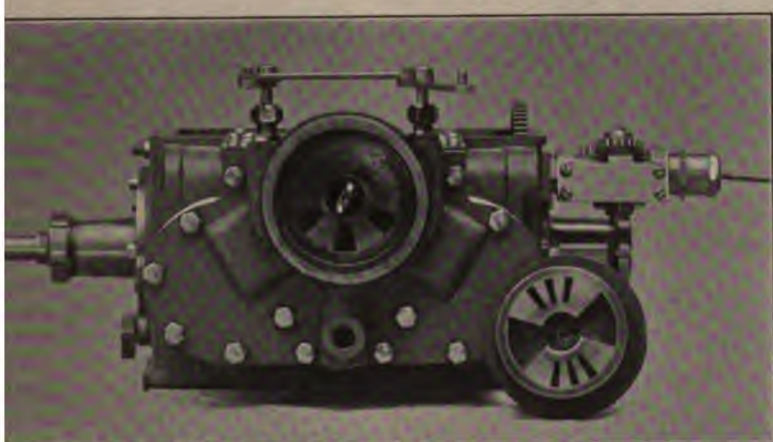


FIG. 2.—TOP VIEW OF ENGINE SHOWING VALVE.

ositions. The pistons are regu-
pistons and are connected to the
ctly through connection rods.
s distributed to the three cylin-
eans of a circular disk valve on
cylinders. From the seat of this
e ports 2, 3 and 4 lead to the
cylinders. The valve itself is
ded with steam ports, and these
ranged that as the valve rotates
be admitted to the cylinders in
and the exhaust will be opened
pistons reach the end of their up-
ke. The valve is rotated from
shaft by means of a set of spur
et of bevel gears and one hori-
d one vertical shaft. The spur
the countershaft drives the lat-
h a claw clutch so arranged that
onsiderable motion between the
parts of the clutch.
k valve *h* is provided with three
cent ports in groups at opposite
between these ports and also
ntral portion of the disk valve
chamber 22 formed in the under

surface, for the exhaust steam from the steam cylinders, communicating simultaneously with the cylinders and the exhaust chamber in the case 6 with the rotation of the disk valve. The ports 20 of these groups are the steam ports in the rotation of the valve *h* in the direction of the arrow, and the ports 21 of these groups are the steam ports during the reverse movement in the other direction, while the intermediate ports are only employed as possible steam ports in starting the engine. A cut off disk *n* lies upon the disk valve *h*, and is provided with slots for pins, rising from the valve *h*, and also with radial ports 24 and 25 in groups of two each at opposite sides of the centre of the cut-off. The disk valve *h* and the cut-off *n* thus move together.

In the valve head of the engine are located two shafts *o* and *r*. The inner ends of these shafts are provided with pinions open to the steam chest. By means of a lever and link mechanism these two shafts can be turned simultaneously an equal angular distance in opposite directions. The disk valve is surrounded by a circular rack and the teeth of this rack mesh with the pinions on the shafts *o* and *r*.

The reversal of the engine is effected by the hand wheel *l* turning the shaft *k*, swinging the clutch *k'* to a position opposite to that previously occupied by the clutch, and in so doing the spindle *i'* is turned, and the valve is moved independent of the cut-off disk, bringing the pins 23 to the opposite end of the slots in the cut-off disk, changing the relation of the ports in the disk to the ports in the valve and the relation of the ports in the valve to the ports 2 3 4 in the valve seat, so that different ports align from those that had previously aligned in the direction of movement of the engine, and so effecting a reversal of the direction of rotation. The steam passes from the entrance in the head through the annular and vertical ways 1 up around the disk valve and cut-off disk to the space between the cut-off disk and the diaphragm

When the cut-off disk and valve occupy the relative position indicated in the sub-figures and the direction of rotation is as indicated by the arrow, steam passes through the coinciding ports of the cut-off and valve progressively to the ports 2, 3 and 4 with the simultaneous rotation of the cut-off and valve and exhausts from the ports 2, 3 and 4 into the chamber 22 as the same comes over the ports in the rotation of the valve and cut-off.

The ports 20 in the valve and 24 in the cut-off disk coincide and are of small area in proportion to the ports 2 3 4 in the valve seat, thus not only regulating the amount of steam admitted, but requiring an appreciable travel of the aligning ports between the ports 2, 3 and 4 from the supply of one cylinder to the supply of the next, consequently shutting off the steam from the one and giving the same an op

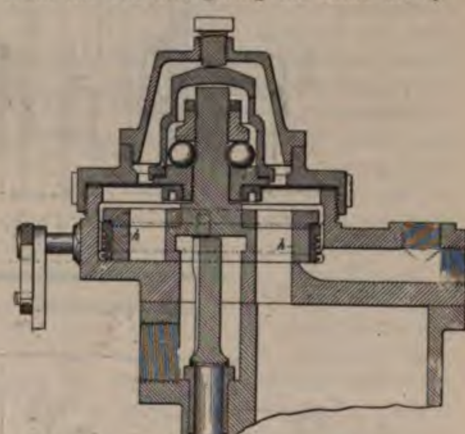
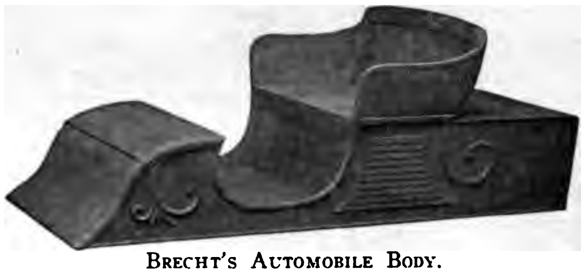


FIG. 5.—SECTION THROUGH VALVE.

portunity to expand in doing its work prior to supplying steam to the adjacent cylinder and so on progressively.

Brecht's Automobile Bodies.

The Brecht Automobile Company, of St. Louis, have recently added a woodworking department to their factory, and are now turning out automobile bodies, of



BRECHT'S AUTOMOBILE BODY.

which one type is illustrated herewith. This body has a folding seat in front, as is now used by many automobile manufacturers. Tonneau bodies are also to be manufactured, we understand.

Two New Spark Plugs.

The plug shown in Fig. 1 was designed by E. F. Brown to eliminate the necessity of removing the plug on the road for ridding it of foreign matter, which might form a bridge from one terminal to the other, rendering the plug inefficient.

The plug possesses a protecting chamber over the insulated terminal, which chamber at once constitutes the opposed or grounded terminal. The sharp edges of the button shaped inner terminal are located at an equal distance all around from the interior wall of the surrounding chamber, leaving but three sixty-fourths of an inch space, this having been found most suitable for the production of a good spark under varying conditions.

Should bridging occur in this plug the vent cock attached to the chamber is

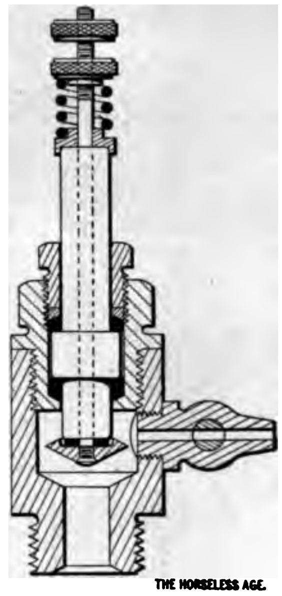


FIG. 1.

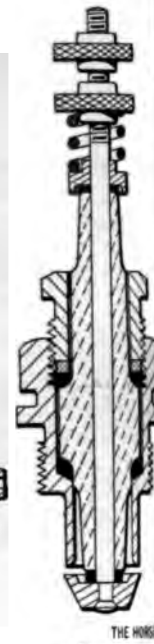


FIG. 2.

opened, when the contents of the cylinder are forced through the spark gap, to the exclusion of any other passage, tearing loose and ejecting through the opening of the vent cock any obstacle which may have lodged between the terminals. The same vent cock should be employed as compression relief cock, which process insures clean terminals from the start and without having recourse to other means. A pressure of from 60 to 90 pounds per square inch, the usual compression carried in gasoline engines, is a most efficient means for clearing away obstructions from between terminals.

When it is desired to remove the inner terminal, the chamber with vent cock may remain on the engine and the inner terminal alone is detached.

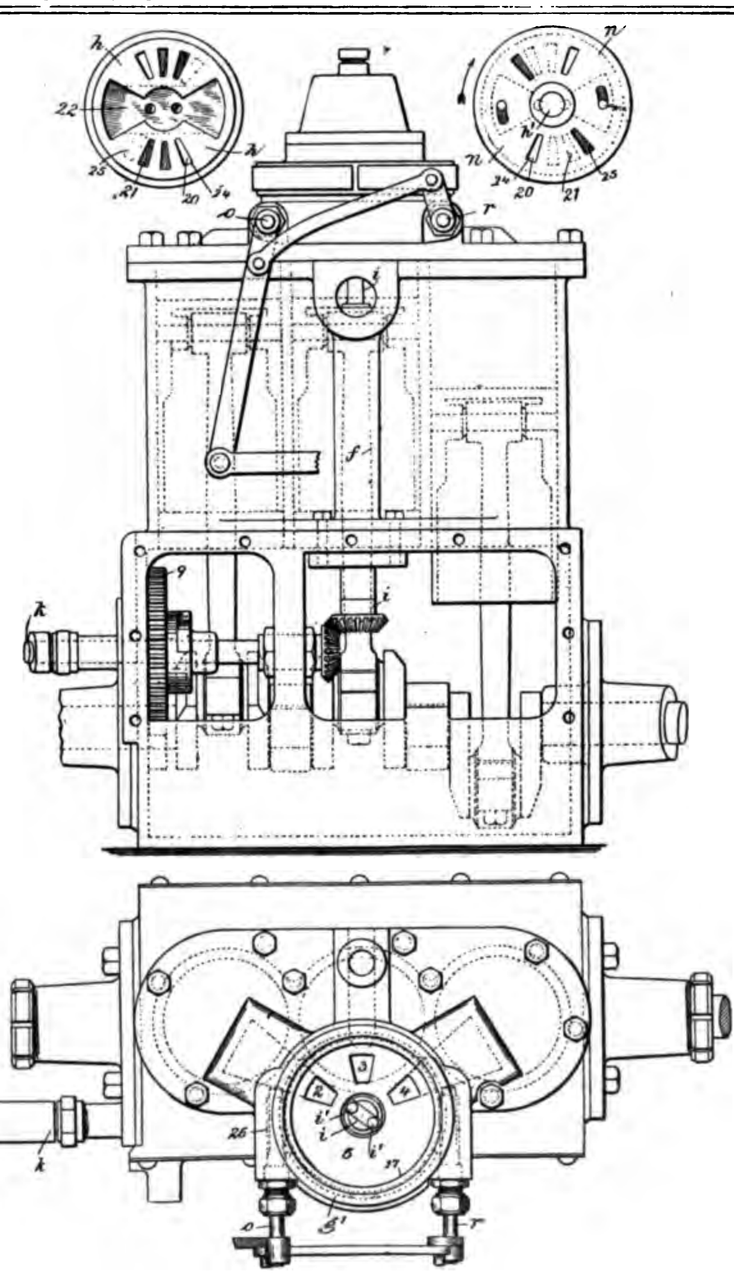
THE WALTER SPARK PLUG.

The central terminal of this plug consists of a circular, inverted cup shaped piece of metal. It measures nearly 2 inches in circumference and is termed by its maker a "mushroom" terminal. Directly opposed to the sharp edges of this circular inner terminal is located an annular metallic body integral with the holder of insulator. The latter is made from the best grade of dense porcelain, with burnt in glaze.

The manufacturers reason that where two terminals, of about 2 inches sparking surface, are opposed to each other the coating of even one-half of these surfaces with oil or other deposits will not affect the formation of a spark.

A further point claimed for this plug is that since the terminals are large they retain a considerable amount of heat, and any oil which reaches them is instantly vaporized and consumed during the next explosion in the cylinder.

The above spark plugs are marketed by A. W. King, M. E., of Maywood-Hackensack, N. J.



FIGS. 3 AND 4.—VOGEL'S ENGINE.

.COMMUNICATIONS..

ter Use of Automobiles.

ORSELESS AGE:

itorial in a recent issue of THE
ESS AGE stated that automobiles
d should be used in all seasons in
rt of the country.
e that automobiles should be used
me, but I am pretty positive that
nnot be run successfully twelve
in a year. The editorial in this
me to me one day after a fair sort
ow storm, when perhaps 3 or 4
of snow had fallen. When the
as clearing up I took out my elec-
age, and it gave me plenty of ar-
against trying to employ the
carriage against snow. The
went along, but it took a great
of power, and the work must have
evere strain upon the whole car-
could get fair speed, but it took
rty to sixty amperes on roads
ordinarily took twenty. It was
to steer straight. In fact, I nar-
caped colliding with a tree because
was wrenched from my hand by
f hard snow on the side of the
The slow speed saved me from a

curtains on and a large boot in
t it was not pleasant riding in a
r the wind forced the snow into the
as it would with one drawn by
Twice when I stopped I had to
l go ahead several times, because
els were in hollows, so that they
around. I had plenty of power,
wheels would not stick to the slip-
face.
n as the snow gets trodden down
mobile will go along, yet it is
ugh riding, for the streets are al-
ed with hollows, and there is dan-
ipping.
inter I went out frequently with
gasoline machine, having power
to plough through snowdrifts in
would be buried out of sight.
as often the first vehicle of any
after a storm. I never found dif-
n getting along, although speed
erally slow. After the roads were
tion for sleighing I took many
os, and always went through in
ape. It was very hard riding,
and the strain on the carriage
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y, which must be subject to tre-
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demonstrated that an automobile
sed in all kinds of weather and in
itions of the road, yet it is not
pleasant riding, and it is also very costly, for many repairs are necessary.

ROBIN DAMON.

The Specification of a Contemplating Purchaser.

Editor HORSELESS AGE:

The writer is in the market for a vehicle of the following description:

Gasoline motor propelled, weighing less than 1,000 pounds, ready for the road without passengers, air cooled motor, wood or steel wheels, flexible frame, dry battery and electric dynamo, engine started from seat, storm covered, 5 to 12 miles speed over fair roads; to climb any hill as well as a pair of horses; properly lubricated from a few oiling places; delivered to first class credit, conditions same as other machinery delivered all the year round.

T. G. BLATCH.

Jump Spark versus Touch Spark.

Editor HORSELESS AGE:

In your issue of December 3 my friend H. B. Haines makes some reflections on the make and break spark which appear to me unjust. I desire to say a word in its defense, on the basis of 15,000 miles experience.

I have operated two machines equipped with hammer break spark and with the most complete satisfaction. I therefore do not agree with him that the jump spark is superior. My impression is that my second machine came from the same factory as Mr. Haines' tonneau, and whatever he may say against the good judgment of overloading a 5x7 slow speed engine, he is a little unfair to its method of ignition. This is simply perfection, provided a few points are observed.

First as to the battery. Put in seven Edison primary cells and bolt them securely. One charge will furnish current for between 2,000 and 3,000 miles. It costs a little over $5. They must be well bolted so that wires are not broken by vibration. Adjust the sparker as the manufacturers direct, allowing the rod to pull out three-thirty-seconds of an inch and the points to separate one-sixteenth of an inch. This adjustment need not be changed, even though it becomes necessary to remove the plug. And it is seldom necessary.

We have repeatedly traveled hundreds of miles without touching it, and 1,000 miles without removing it. My first engine was entirely satisfactory in its ignition, and after I had learned that dry batteries were a delusion with the make and break spark we never had a moment's trouble with our ignition, either in my first or second carriage. And my second is eminently more simple than the first. We simply forget that we have a spark. As long as any part of the elements remains in the cell and the wiring is perfect you are bound to get a spark, and a good fat one, with this type of battery.

Until someone shows me a jump spark plug and outfit that need no attention for 1,000 miles I shall not admit the superiority of the jump spark. If there is a fear that the porcelain may break one can carry a second sparker, whether it be jump or make and break. One of my greatest delights in automobiling has been the regularity with which this engine fires (and it is the same as H. B. Haines'). You can drive it hour after hour, up hill or down, and its puff has the regularity of the tick of a clock. Speed it fast or run it slow, never an explosion misses or comes irregularly. Mine, of course, drives only a runabout, not a tonneau. But there are few hills, even though long, which it will not negotiate without change of gears and carrying two passengers. I have previously expressed my belief that this type of engine is a passing affair, and I still hold this belief, but the ignition is as near perfect as anything we will get soon.

I may add, my opinion is the coming engine will not have a jump spark, vibrator, expensive secondary coil and delusive dry batteries. I venture to prophesy that the present vogue of the four cycle engine of stationary practice will be followed by one of two cycle type of two cylinders. It will be much lighter, freer from vibration, equally flexible and just as powerful and sparked by a make and break sparker of very simple mechanism. The current will be supplied by a generator or by a reliable caustic soda wet battery.

DANIEL LONGAKER.

Routes from New York to Philadelphia.

Editor HORSELESS AGE:

The delights of motoring over perfect road through a pleasant country must be tried to be appreciated, and we advocates of the new vehicle cannot do better than facilitate such trials. One thing needed is a knowledge of where the good roads are and how we may find our way from place to place by means of such roads. For example, between Philadelphia and New York and similar large places there should be no question about which road is best, but I have yet to find anyone who has tried the several routes between the two cities and is able to advise with certainty and intelligence on the subject. F. S. Eveland says: "Go by New Brunswick, Hightstown, Trenton, Bordentown and Mt. Holly, and the road is fine all the way except along the trolley lines after passing Mt. Holly," while others who have made the trip have advised other routes. I decided to take Eveland's advice, with the following result:

I went by ferry to Staten Island, thence along North Shore to Elizabethport, from thence to Rahway, passing straight through toward Metuchen, without turning down into the city. At the Pennsylvania tracks (six in number) I failed to see the sign in the dark, and, crossing the tracks, went straight ahead to Woodbridge, instead of making a sharp turn to

the right before crossing, and had to retrace. At Metuchen the trolley line to the left leads to New Brunswick, but it is not as good as the "old road" which runs along the south side of the Pennsylvania railroad. At the main cross street (George street), New Brunswick, turn to the left along the trolley line, then turn to the right one block beyond where the trolley turns, after which the first turn to the left (George's road) leads to Cranbury and Hightstown. Passing through this place, follow the main street to the right to Windsor. At Windsor the macadamized road turns square to the right, 2 miles to Edinburgh (Garrison's blacksmith shop), then square to the left toward Trenton. From Windsor the road straight ahead leads to Allentown and Bordentown, 10 miles, roads partly stone and partly dirt, good only in good weather. The road by the way of Trenton is 4 to 6 miles further, but is a modern road. When at the Fair Ground entrance, turn to the left down Greenwood avenue to Chambers street, where a square turn to the left leads into Broad street at a church near the end of the double tracks of the trolley line. This point should be watched in the reverse direction lest one drive down Broad street into the city instead of along Chambers street, as intended. At white house turn almost squarely to the right. At Bordentown turn to the left on the main street, and at the fork of the roads about three-fourths of a mile further turn slightly to the right. This leads through Columbus almost straight, coming to the Jobstown pike about 4 miles farther, where a square turn to the right leads from the modern stone road on to a yellow clay and gravel pike (toll, 4 cents) to Mt. Holly.

Up to this point the road is modern in every sense of the word; it is clean, level, free from stones or gutters, and, in short, perfect. The speed is limited only by the ability of the vehicle, and 20 miles per hour on such a road is neither unsafe nor reckless, as any lawmaker would doubtless admit if he could be given a few rides thereon. The remainder of the road, however, is a splendid example of bad road making as compared with good, for the smooth gravel will not pack and the clay mixed with it for that purpose absorbs water hungrily. As a result, the surface after an all night's rain is cut into tracks filled with water, in many places hub deep. Where clay predominated the mud was worse and more sticky, so much so that several spots were all but impassable.

At Mt. Holly turn to the left at the main street and follow the trolley around the first turn to the right, thence straight ahead toward Camden. The first 4 miles were fairly good. Then follows more clay and gravel, at places so sticky and cut so deeply that the slow speed clutch was taxed to its utmost and had to be adjusted in the worst part of the mud—a feat which, fortunately, could be accomplished without stopping the motor or getting out of the vehicle. Visions of a stuck vehicle, with consequent disagreeable wading around in mud, and wishes for a three wheeler with its lessened resistance, arose, but we kept moving and finally passed the worst. At Moorestown the road to the left along the trolley leads direct to Camden, although the other road looks tempting and is smoother, but farther. The Belgian block pavement is solid in any weather, although not smooth. Barring the last 25 miles after leaving the modern road, the route is ideal, but until a better way is found between Trenton and Philadelphia it is certainly not perfect as a whole. No stops were made for scary horses, as is necessary in the less traveled districts, and over such roads the motor gave no trouble whatever, the strain undoubtedly being many times less, except in the mud mentioned, than it is on the rocky roads of Berks County.

Near Cranbury the heavy rain of the night had caused a torrent to overflow the road 12 to 18 inches deep for a distance of 75 feet, making it quite questionable whether our mixer would not be flooded with water, stopping the motor in the deepest part; but nothing happened, and we were quite thankful that this flood was not found in conjunction with the mud roads described. By turning to the right at Columbus 8 miles of very sandy road will bring one to Burlington, from which place the road is fairly good to Camden or Moorestown, but whether better or worse than the roads in the vicinity of Mt. Holly is questionable. My next attempt will be from Philadelphia to Trenton on the Pennsylvania side.

Since writing the above the road from Philadelphia to Trenton by the way of Holmesburg and Bristol has been tried and found fairly good. It is a little sandy and therefore better in wet weather than the other road; but in dry weather the New Jersey road as described is best, although farther. Improvements were being made on this road, and since it is several miles shorter than the New Jersey road it should be given preference generally.

CHAS. E. DURYEA.

"When Doctors Disagree 'Tis Folly to Be Wise."

Editor HORSELESS AGE:

After reading the most interesting criticism of the automobile from the pen of that caustic writer, Mr. Damon (every word of whose effusions impresses one with his sincerity and hard pan experience), one can but feel that, after all, the automobile is not what it should be. Were it not for the diametrically opposite experience I have had, and the fact impressed upon me more forcibly every day "that I do not know it all," I should feel that I was a prodigy of mechanical skill after comparing my "experience" with his! I have automobiled for some 22,000 miles, continuously, winter and summer, in Maine, Massachusetts, Rhode Island, Connecticut, New York and California, with various machines of different makes, economically and with marked pleasure and success. I have also kept driving horses and an accurate account of expenses of both means of locomotion, and I am convinced that Mr. Damon's experience is exceptional. I have operated a steam surrey over all kinds of roads for business and for touring, and have persuaded myself that—outside of the delight and satisfaction, to which driving can't be compared the same day—the expense is far below that of maintenance of the horse. My experiences with the light gasoline runabout, which I keep for town use, and with the heavy touring high powered gasoline car are identical with my steam experience. Now, how can these things be? Yet I have a neighbor—with the same kind of a car as my touring car—whose experience is even worse than Mr. Damon's. While I have skipped along with slight expense, his repairs have figured up $400 in two months, and I affirm that he apparently knows more about the subject than I ever shall. We both employ the best of expert talent to care for our machines, and, while I always operate mine myself, his expert operates his. I always carefully examine every working part each day and personally adjust when adjustments are needed; I am careful that every part needing lubrication receives the oil. I see that my tires are suitably inflated, and have an extra one to put on in case of a break occurring rather than run on imperfect ones. But all these attentions are axiomatic and what any sane man would do without being told. "Depend upon no one, but see to it yourself," is my rule of practice.

LEARNED HIS MACHINE.

Before using a new automobile or attempting its operation it has been my custom to thoroughly understand it in every detail. To know how it is put together and also how it must be taken apart, if need be. Such men as Mr. Damon are undoubtedly much more thorough and intelligent upon the subject than I can be. So that this cannot explain the seeming paradox. It must be, then, that machines of the same make, or tires of the same brand, are put out differing each with the other. The one will stand up and keep out of the repair shop, while the other has a constant penchant therefor. One tire or set or tires will stand up for 10,000 miles, another set will cost their owner more than they are worth in repairs and disappointment, as well as plunge him into "automobiliousness."

Now, I can affirm with all modesty and fairness that automobiles are economical, that they can be operated without constant trips to the machine shop, and that I can maintain two automobiles—in constant use—at less than the expense of horses. And there must be others whose

ces have been unlike Mr. Da-
nd similar to my own. If auto-
on the average should be found
disappointing, vexatious and ex-
as portrayed by Mr. Damon's enter-
en—well, I shall not cease to urge
rs to take this road, and stick to
h thin and thick, feeling sure that
I find the path strewn with roses
ht with sunshine.

roses have prickers of the same
l and the sunshine has a sun-
ip the sleeve, but both can be
ed.

'other road," which all comers
avoid, is black with searchlight
and strewn with broken spark
passé monkey wrenches, burned
ers, redhot uncoolable motors,
proof tires punctured o'er and
eased electric batteries, etc., and
unabridged encyclopædia of ex-
It is turnpiked, but the pike has
lue from the sulphurine covering
oad. Along this road upon one
s a sluggish stream of poor gaso-
itting suggestive odors. In the
gutter, what water there is is
and cannot be used in boilers.
ntal columns line one side of this
commemorate the mistakes you
de—of the same description. The
e of the road has barren stretches
for monumental success. This
s monumentally lonesome.
this breakdown road you are sure
your high toned neighbor coach-
his elegant black four-in-hand.
your black two hands look like
Note his look of soulful sympa-
en to his kindly cordial offer to
home. You feel sure that this has
of his bright, happy days—but
s! Now keep off this road—even
appen to own a steam roller; roll
er direction.

ews has just reached us in Cali-
y wireless telegraphy, that a beau-
ad transcontinental puncture proof
(part of the way) is to be con-
rom New York city to San Fran-
l. (if), by the sunset route. This
o have an easy down grade both
be without a twist or turn, and to
east and due west and a long ways

l automobilists here decided not
for this beautiful road, but had
their automobiles by the railroad
rnia, and are having lots of fun
n in the meantime. The roads of
a are extra fine and freer from
les than Eastern roads; yet we all
keep up an awful thinking about
tiful road and that perfected auto-
et to come, instead of fully enjoy-
e now have.
onvinced that these dreams of the good roads and of the gentle "unbreakdownable" automobile are but the automobilists' distant loom of the mirage, with a breaking rough sea in the immediate foreground of the picture.

LINCOLN CLIFFORD CUMMINGS.

Gasoline Engines in High Altitudes.

Editor HORSELESS AGE:

We hand you herewith New York draft for $3 to pay one year's subscription to your valuable paper. Have been a regular subscriber for several years and consider its policy a fearless and aggressive one that will advance the interests of the whole automobile industry. We like the articles that appear in it from week to week. They show that at least some of the writers have "been there."

We are 2,100 feet above the sea level, and the article from Colorado in regard to the rarefied atmosphere and its effect on the working of a gasoline engine recalls our experience. We find that the valves as marked at the factory will not give the proper mixture on at least more than a dozen engines, when operated at this place.

Have had some experience with autos and think the best way for one to familiarize himself with one is to make the motor, transmission and the gear. He then will have the construction well instilled into his mind. To be sure, everyone cannot do this, but think anyone who can will be well paid who will do so.

M. E. CARLEY.

Superheating Coils.

Editor HORSELESS AGE:

Will you, or some of your correspondents who have had experience with superheating coils, kindly tell me the best way to put one in my carriage?

I have a 16 inch fire tube boiler, 13 inches high, with no special superheating tube nor provisions for putting one in.

I would much prefer not to go through my boiler if I can get as good results without doing so, for, of course, it is an experiment, so far as I know.

Some tell me I will get little if any benefit from a superheating coil, while others assure me of a great gain in economy.

My idea is to go from the throttle valve to the firebox, and after putting two coils through the fire go directly to the engine. As the distance from firebox to engine is only 12 inches, I believe it possible to cover the pipe, so little heat will be lost.

I believe others than myself will be interested in this matter, for I have no doubt there are quite a number of persons owning steam carriages who are not satisfied with the number of miles they are getting out of their gasoline and water supply.

Please state the size of pipe and whether it should be steel, wrought iron or copper (I have been advised to use all three); the number of coils and their shape, that is, the distance apart of coils, and how near the outside of the burner the first coil should be, or how near the centre of the fire, and the distance between the upper part of the coil and the bottom of the boiler; also whether the pipe should go through the boiler once, twice or not at all, or over the boiler. I also would like to see this thing freely discussed, and find out just how much is known about the matter.

In closing I will say I have 2½ inches between the top of the burner and the bottom of the boiler.

INQUIRER.

[We believe that a superheating coil in the firebox would not last any length of time, owing to the excessive heat. The correct place for the coil, in our opinion, would be the flue space above the boiler. Seamless steel tube would be cheaper and practically as efficient as copper. There is no doubt that a superheating coil will improve the economy of the vehicle, but we regret to say we have no data based on experiments along this line, and the actual value of a superheater can probably only be determined by a trial. Would say that in the last A. C. A. 100 mile Endurance Contest several steam carriages, which differed from the rest in using superheated steam and condensing, showed a fuel economy per unit of weight almost exactly twice the average of the other steam carriages, so that superheating seems to be quite effective in increasing the economy.

If any of our readers have tried superheating the steam from a fire tube boiler we would be glad to learn of the details and what results have been obtained.—ED.]

Flat and Conical Poppet Valves.

Editor HORSELESS AGE:

Hugh D. Meier in his argument in favor of the flat valve as against the conical when used in the horizontal position overlooks some important points.

In the first place the action of the spring on the valve. If the spring seats properly at both ends, being under compression all the time, it is inclined to make the valve seat centrally, and thus cause little wear on the valve stem or its bearing. Depending to some extent on the metal used for the guide, the hole in the guide needs to be only enough larger than the stem to prevent binding when hot, and no deposit is likely to form, as it would be constantly rubbed off. There should be an oil hole in the guide and a drop or two of kerosene or oil allowed to run in occasionally, especially when the engine is new. There is very little wear on either stem or bearing, and the stem becomes polished where it slides in the guide; the inlet valve is more likely to stick from gummy deposit.

But supposing that the hole in the guide is so much larger than the stem and ignoring the action of the spring, and also assuming that the action is as shown, what would be the effect on the face of the

flat valve and its seat? As the valve does not rotate the continual hammering of the valve on its seat would wear both faces eccentric, with the result that a slight turn of the valve would prevent its being tight. Let us have more cogent reasons than those enumerated. ST. RUSS.

Effect of Altitude on Gasoline Engines.

Editor HORSELESS AGE:

At an altitude of 8,000 to 9,000 feet above the sea level what effect would the rarefaction of the air have on the operation of a gasoline motor? As we have here (California) a zero and under temperature in winter it would be difficult to use steam.

E. R. BROOKS, M. D.

[At an altitude of 8,500 feet the atmospheric pressure is only 10.6 pounds per square inch instead of 14.7 as at sea level. If the compression is kept constant the power will be reduced in the same proportion—i. e., about 25 per cent. If, however, no changes are made in the compression space of the engine the reduction of power will be still greater. It will be advisable to reduce the compression space of the engine by 25 per cent., so that the compression at that altitude will be the same as it would otherwise be at near the sea level.—ED.]

Explosion Engine Queries.

Editor HORSELESS AGE:

What brake horse power would a double cylinder engine 3½x6 inches with 1½ inches compression space develop at 500 revolutions per minute? The engine is water cooled, has jump spark and a 105 pound flywheel.

Would such an engine drive a two seated carriage, weighing 1,800 pounds with load, at a speed of 20 miles an hour, the carriage having roller bearings and 1½ inch solid rubber tires? What would be the horse power of a single cylinder, 4¾x8 inch water cooled engine at 500 revolutions per minute, the compression space being 2 inches?

F. C. THOMPSON.

[The double cylinder 3½x6 engine should give about 4 brake horse power at 500 revolutions per minute. This would just about drive the vehicle at 20 miles per hour on perfect road and geared for maximum speed, but it would not be sufficient power for general use on good and bad roads and up and down hill. A single cylinder, 4¾x8 inch engine should develop 4½ brake horse power at 500 revolutions per minute.—ED.]

The Evolution of the Automobilist.

Editor HORSELESS AGE:

After getting over the "calf love" stage of automobiling the people who use autos often sort of expect—or try to get—a machine that will run well pretty regularly. At least that is my present feeling.

When I first had an automobile it didn't make much difference to me whether it was running or I was working on it trying in an amateurish way to make the engine turn with its own power. I could generally make it move when I had hold of the crank, and sometimes I think I was happy in that position. Beginnners do not know what to expect, and so they are pleased with whatever is their lot. If the carriage can be induced to go a long distance, it travels far from home. If there are breakdowns, with consequent trouble, dirt and expense, the feature is looked upon as part of the game. The new owner of an automobile is anxious to establish a record for long distance running, or speed, and he is therefore apt to lead a strenuous and rather dirty life for some months, or until the fever wears away. At least that was my experience, and I notice that others get into the same ways.

I remember when I thought nothing of sitting up until midnight to aid in making repairs, so that the machine might be ready for use the next morning, when I hadn't any use for the carriage except for pleasure riding, and the chances were that I should not take it out. I felt that the machine must be ready for instant work, and was not easy so long as it was upset. I've labored by the roadside many hours, and also in the stable, when the hours passed like magic, because I was engrossed in the work. Incidentally I will say that even now I occasionally do a little stunt, but somehow the work has lost some of its first glamour. It is now real work.

EXPECTS MORE NOW.

After going through the mill with an automobile I have now arrived at the point where I want one that will not bother me on a long or short run—at least not regularly. In fact, to draw comparisons, I feel that a machine that would do as well as a horse would fill the bill. I mean by this that an automobile should do its best generally and not make a driver crawl into and over it, thus getting both greasy and tired. When I go out with horses I am not often obliged to take the carriage apart or unharness the horses. In fact, in an experience covering over twenty years in driving horses I do not remember but one instance where I did not get home "under my own power." That time a wheel was smashed by a reckless racer who ran into my carriage. Maybe I shall, some old time, get an automobile that will be as reliable as the equines, who now munch hay and look wise as they smell greasy machinists fooling around the stable. Yet, so far as a limited observation goes, I have not seen any self propelled vehicle in actual use that would fill my ideal. Still, there is a lot of fun in automobiling, even with some of its uncertainties.

Personally, I generally get home with the automobile—in fact, in three years I have only left the automobile three times. This is not a bad record, when it is taken into consideration that my automobiles are out practically every day and often at night, going from 5 to 50 miles a day. I now feel reasonably certain that I shall get back home, no matter which of my three automobiles I use, but if I take either of the gasoline rigs I always go prepared for doing work of a dirty and greasy nature. Often I get through without touching a wrench, and it is the exception that I do much labor, but there is always an uncertainty.

INSPECTION FAILED TO PREVENT.

I have found that the most careful work before leaving the stable, and rigid inspection, availed little in preventing some mishaps. Of course such inspection will reveal loose nuts and screws. As a matter of fact I do not think I was ever discommoded by loose nuts or screws, so I do not see any particular good in squinting for them at every run. They generally make themselves heard long before they will drop out. I will cite as an instance the futility of trying to prepare for work. Last Sunday I went out with a friend whose carriage had just been thoroughly overhauled by a machinist. It took him an hour to go a mile, because something went wrong with his spark plug after he had run 100 feet. When he reached my house the engine was going finely, and we started off in a cloud of dust at top speed. In five minutes the engine stopped gently, on the main street, and just as people were coming from church. A wire had broken off, away in the interior, where oil and grease prevailed. My friend was dressed for Sunday, but he had to dive in and make repairs. He did a good job, but my! His hands were black, cuffs likewise, and sundry streaks adorned his face. And, of course, church folks smiled and remarked that running an automobile was wicked. My friend's remarks were wicked, anyway. We started and went 4 miles to inspect a bridge. Just as we arrived at the bridge the engine stopped, and we made a bluff of looking over the work, while casting eyes about the carriage, because there was an inquisitive crowd about. Finally we had to tackle the job. It was trouble with the spark plug again, which consumed fifteen minutes. The carriage had stopped in a wet spot, and the water soon ran over our shoes.

I will not stand up and say that previous preparation is not desirable. On the contrary, I think that unless a great amount of care is used trouble is sure to come. My stand is that with the ordinary automobile run by the ordinary man, it is seldom that a perfect run is scored, no matter if the distance is not 10 miles. I know I have said about the same thing before, but as I haven't seen anything to change my views I repeat them to affirm my standing.

Thoughts such as I have briefly outlined will undoubtedly be suggested to about every beginner with automobiles. And some will hang on a long time. Yet, after owning a carriage long enough to understand its phases, almost any person with the

hanical ability should be able to lmost anywhere he wants to go, nothing serious breaks. The man wever, turn himself into a machin- willing to do so at instant notice. that many owners of automobiles and say, "Why, I never have any Yet, look at Dr. Kittredge, who en a long letter based on the "no theory, and yet he tells of carry- gallons of water through the hot g distance. Such exercise may not e to some folks, but after they sed forty and weigh 200 pounds ot deliberately seek experiences of . Not in summer, anyway. This trip I took once with a friend who steam carriage. We were about urs going 20 miles, and I have al- d we stopped 500 times either for to hunt up troubles. My friend he was having the time of his life. onclude that many of the men who rouble in connection with an auto- ave similar dispositions.

ROBIN DAMON.

Damon's conclusion seems to be es- the same as that of our corre- . Mr. Cummings, that "it all de- the liver."—ED.]

rmostatic Fire Control.

LYNN, Mass., December 6.

ORSELESS AGE:

y to inquiry of Dr. Duval about g a flash generator by means of a cator, will say that Prof. Thomson such an indicator on his carriage st three years with satisfaction. It briefly in a thermo-electric couple d to the steam exit from the boiler erates a white disk appearing in ng of a black dial on the foot- plain sight of the operator. All licates hot boiler, all black cold, between normal.

vantage we find in this arrange- against automatic thermostatic f fuel lies briefly in the fact that the operator an opportunity of ng the actual needs of the con- r instance, if a carriage with ther- control is descending a long hill nother hill to climb on the other ll sometimes happen that the car- the climb will be left with insuffi- m. With an indicator and inde- control one may guard against rning on the fire on the last part scent in anticipation of the fol- se. At the same time if in run- the level it is known that heavy ing will have to be done at a e, one can prepare for the emer- The indicator is also somewhat licated than the automatic fuel We have used both on our car- d among various operators the ill be divided as to which is the t as automatic fire control in a e tube boiler versus hand control by steam gauge is a subject of discussion. For a touring carriage hand control seems to be preferable; for city work, where a considerable number of starts and stops have to be made, the automatic has distinct advantages.

H. LEMP.

...OUR... FOREIGN EXCHANGES

The Chelmsford Steam Touring Car.

The Clarkson & Capel Steam Car Syndicate, of Chelmsford, England, have recently brought out a large steam vehicle suitable for use either as a private omnibus or a touring car. This vehicle has been the subject of a series of articles in the *Automotor Journal*, upon which the following description is based.

The body is constructed largely of aluminum. The side windows are arranged so that their upper halves can be folded down when desired, and there are also two curved windows in front, which, when opened, allow the passengers to communicate with those on the front seat. The car is fitted with artillery wheels shod with 3 inch solid rubber tires. It has a wheel base of 110 inches. The main frame is rectangular in shape, and is constructed of channel steel, 2½x1¾x¼. The whole of the machinery is supported on this frame.

THE BOILER.

The boiler is of the common fire tube type and is placed on the frame in front. It has a 3-16 inch seamless steel shell, which is formed in one piece with the upper tube sheet. The shell is 20 inches in diameter and the tubes are about 18 inches long. The boiler contains 512 seamless steel tubes of 9-16 inch outside diameter and No. 22 gauge. It is tested to 750 pounds c. w. p. and the normal working pressure is 250 pounds.

The steam from the boiler is carried through a superheater before passing to the throttle valve; the superheater is of the gridiron pattern, and is M-shaped; it is placed above the burner.

THE BURNER.

The Clarkson kerosene burner (described in THE HORSELESS AGE of May 28, 1902) is used. The vaporizing coil of the burner, made of steel tubing wound with nickel wire, is heated in starting by the lamp P. The products of combustion from the burner are carried away through the funnel A^3, which is of oval cross section and projects vertically from the bonnet over the boiler.

THE FUEL FEED.

The main oil tank B (28 gallons) is carried at the rear and is secured to the main frame; the oil from it is pumped into a pressure chamber B^1 mounted behind the boiler on the left. The upper portion of this chamber contains a certain quantity of air, and the oil is forced into it from beneath. Provision is made by which air can also be pumped into it by hand when desired, and two try cocks are fitted in order to enable the driver to ascertain the level of the oil in it. The relative space occupied by the air at a certain pressure is so calculated as to maintain a sufficiently high pressure for feeding the oil into the burner when the car is at rest, and when the oil pump is consequently not working. An auxiliary pump permits the oil to be fed into this pressure tank by hand, and so replenish the supply if the car has at any time been left standing for an unusually long period with the burner alight.

The try cocks project through the dashboard or dial board, and a cup is fixed beneath them to catch any oil which may be allowed to flow from them. This cup is provided with a wire across the top to indicate a certain level, and thus to allow a certain fixed quantity to be measured off into it. The bottom of the cup is fitted with a cock from which a pipe leads down

THE CHELMSFORD STEAM CAR (FROM THE "AUTOMOTOR").

into the starting lamp P, and thus a definite quantity of kerosene can be fed into it without it being necessary for the driver to handle the oil in any way. It is then only necessary to throw a lighted match into the burner and to start a fan working.

The oil from the pressure tank B' flows direct to the burner through a stop cock, which is placed on the dial board immediately in front of the driver. The burner itself is regulated by an automatic device N, which reduces the size of the flame when the steam pressure reaches a certain point, and automatically opens up the burner to its full power as the pressure again falls.

THE AUTOMATIC FUEL REGULATOR.

The automatic fuel regulator is similar in principle to those used on the majority of American steam carriages, but in place of a diaphragm a plunger piston is used. A section of this device is shown in Fig. 2. The lower portion of this fitting forms a cylinder for the plunger N^1, a steam pipe from the boiler being led to the bottom of it. The piston N^1 is fitted with a rod N^4 and a strong helical spring N^2, the latter tending to keep the piston down at the bottom of the cylinder. The upper portion of the fitting is secured to the lower portion by two steel rods, and the piston rod N^4 is connected by adjustable nuts with a cross piece engaging with the short arms

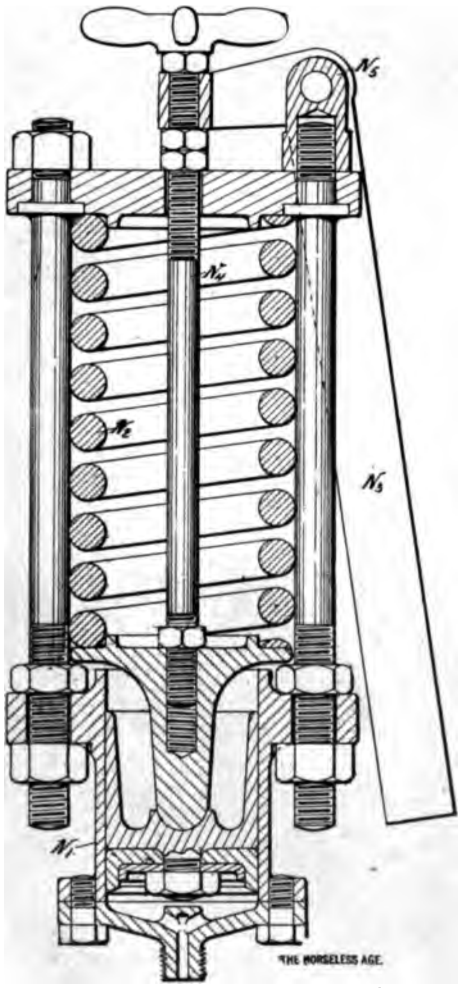


FIG. 2.—SECTION OF AUTOMATIC FUEL REGULATOR.

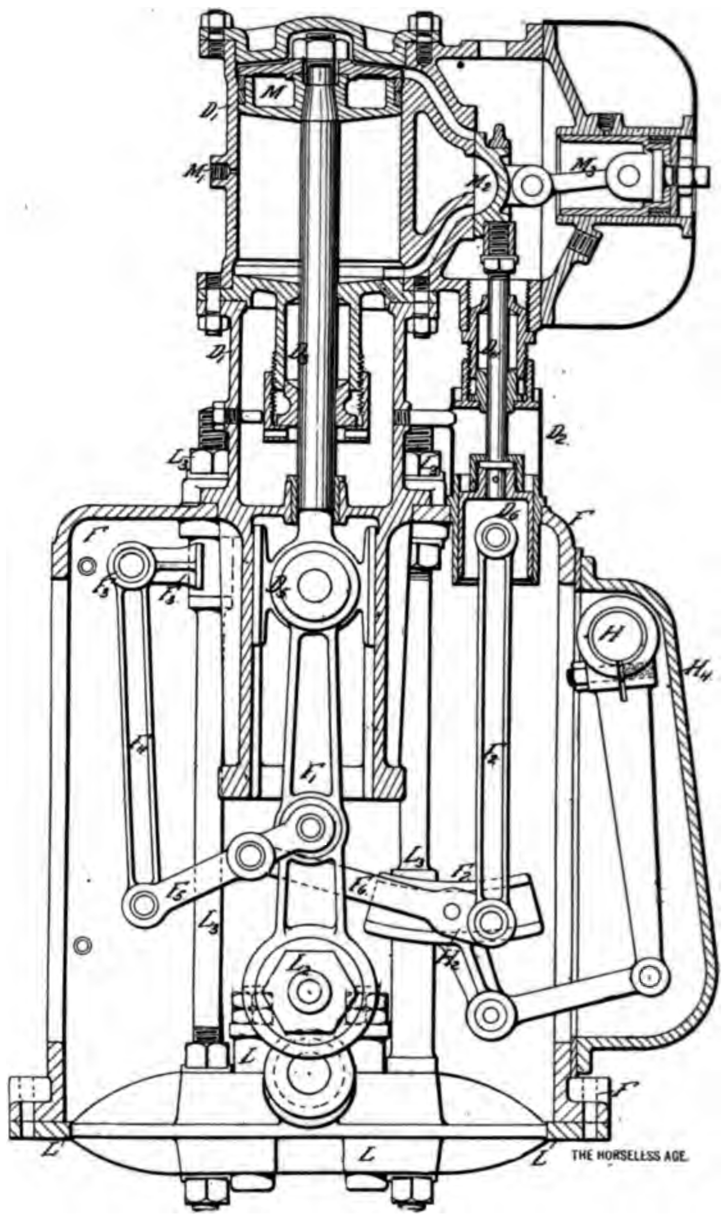


FIG. 3.—VERTICAL SECTION THROUGH THE ENGINE.

of a pair of bell crank levers N^3. The levers are fulcrumed at the ends of the piece N^5, and their longer ends are connected with the device which regulates the fuel and air supply to the burner. As the pressure of the steam rises it lifts the piston N^1, compressing the spring N^2, and causes the bell crank lever N^3 to move about the fulcrum N^5, thereby reducing the size of the flame. Formerly the Clarkson burner was adapted to hand regulation only.

THE WATER SUPPLY AND FEED.

The water supply is carried in two long tanks C beneath the seats in the main portion of the body, and which project forward beneath the front seat. They have a combined capacity of 34 gallons, which has been found sufficient for a run of 120 miles, the fuel supply also lasting for a similar period. A large gauge glass on the left of the dial board shows the level of the water in the tanks. The water is pumped by a mechanically operated pump into the boiler, and the driver regulates the quantity delivered to it by a bypass. The water tanks are provided with circular removable covers C^1, two of which are seen in the drawings beneath the front seat. The covers are of large size, and a special funnel, containing a gauze strainer, is provided for filling the tanks. The water is pumped from the interconnected tanks C through two feed water heaters C^2 to the boiler; the water passes through both heaters.

THE ENGINE.

The engine is a 12 horse power horizontal two cylinder, simple, double acting one, with cylinders 4x4 inches. The cylinders are bolted beneath the main frame to castings D^1, which encloses the piston rod and the valve rod stuffing boxes D^3 and D^4. The cylinder oil is forced by the pump fitting on the dial board through pipes S, which enter the top of the cylinders at M^1. The oil finds its way through the ports at the bottom of the cylinders to the slide valves M^2. The devices M^3 maintain the valves M^2 against their working faces.

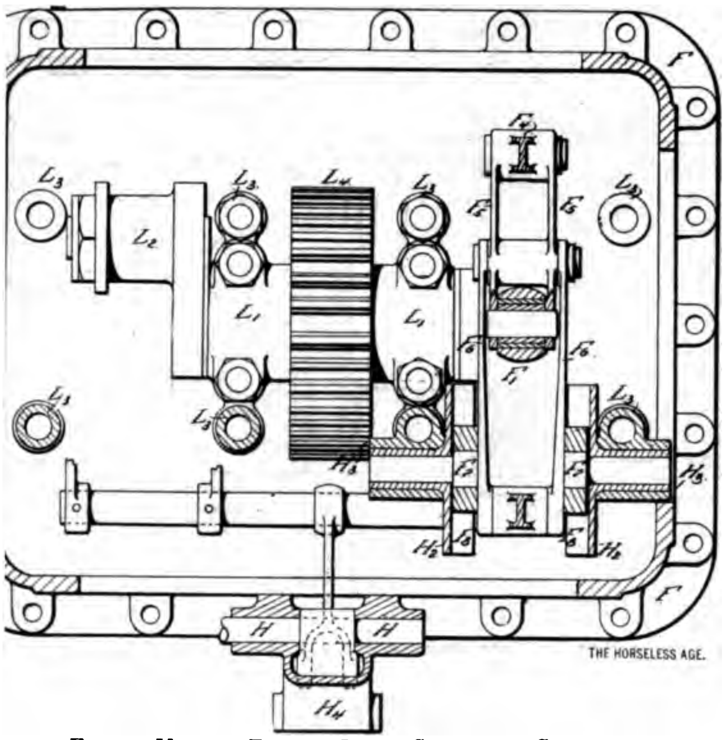


FIG. 4.—VIEW OF ENGINE CRANK SHAFT AND CASE.

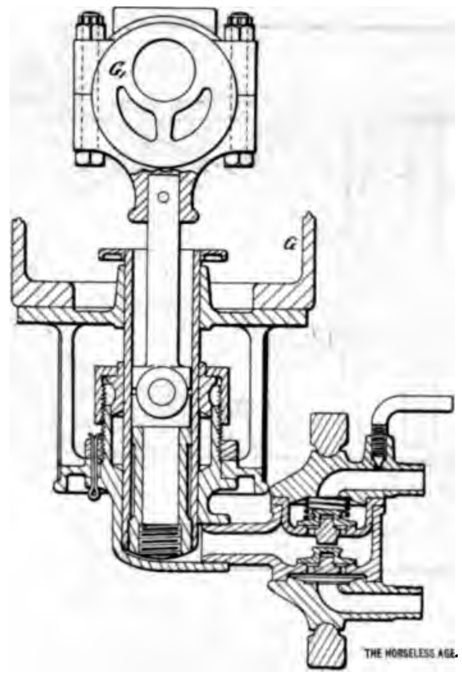


FIG. 6.—PUMP.

ıgs being used. The casting D^1 ;uides for the crossheads D^5 to ıd it also receives the guide ·r the valve rods D^4. The rods stuffing boxes and the guides by a light sheet steel cover D^2. of the valve gear is enclosed in the top of which is provided inspection cover. This casing ı place between the casting D^1 :ing L, which forms the crank gs, by eight steel rods. These e required stiffness to the con- the direction of the thrust of and the casing F itself serves purpose of assisting in making rigid and of providing an oil sing. A "Joy" valve gear is he details of which are clearly ıe drawings. The brackets F^3 place by the upper steel rods ackets form rigid fulcrums for g levers F^4, the other ends of ivoted to other links F^5. The F^5 are pivoted at their lower to the connecting rods F^1, and rry fulcrum pins about which : links F^6 are mounted. The rminate at their lower ends ›nnecting rod F^2, and are piv- These links F^6 have externally projecting pins F^7 at a short distance from their lower ends, and the pins F^7 fit into corresponding holes in blocks F^8, which in turn are free to slide in curved paths formed in guide pieces H^2. The guide pieces H^2 are themselves mounted in such a manner that they can be rocked about a centre, projecting sleeves which form a portion of them being carried in bearings H^3, in brackets which are fixed rigidly to the lower steel rods L^3. The connecting rods F^1 are thus caused to operate the connecting rods F^2, and therefore the slide valves M^2, but the manner in which they do so is determined by the position in which the guide pieces H^2 are set about the centre of the bearing H^3. When they are caused to rock about these centres the direction in which the engine runs is varied, and the degree of cut-off is also changed. In this particular adaptation of the Joy valve gear the shaft H, which passes across underneath the casing F, is connected with the guide pieces H^2 in the manner shown.

The crank shaft is made with two overhanging cranks, L^2 (Fig. 4), which are set at an angle of 90 degrees to one another. It is carried in bearings L^1, which are formed in the casting L. A large steel spur wheel L^4 is fixed to the centre of the crank shaft between the two bearings L^1. The power of the engine is transmitted by it to a phosphor bronze wheel of twice its size, surrounding the differential gear.

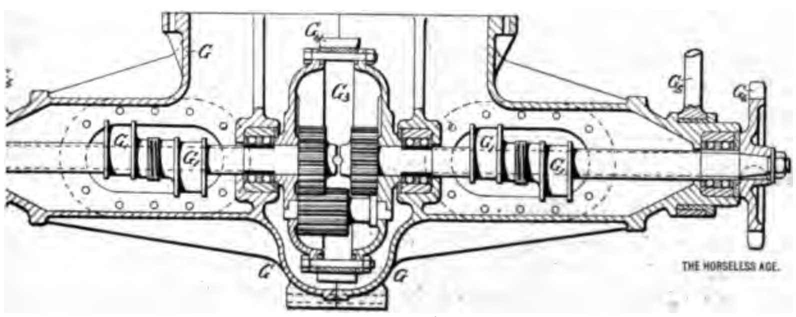


FIG. 5.—SECTION THROUGH THE COUNTERSHAFT.

THE CONDENSING SYSTEM.

The exhaust steam from the engine is taken by two separate exhaust pipes, E, to the feed water heaters, C^2. These feed heaters are covered externally with wire wound into spiral form in order to assist in cooling the exhaust steam. The steam then passes to the opposite ends of the tube E^1, which forms the top of a V-shaped cooler surrounding the closed in front portion of the car. It will be noticed that the shape of this radiator resembles a V in the plan view, and that the top tube E^1 is connected with a parallel bottom tube, E^2, by a large number of vertical wire covered tubes, E^3. The steam is not compelled to pass through these vertical tubes, but a certain amount of it flows into them, and is thus condensed. The bulk of the steam flows through the connecting pipe E^5 into an S-shaped condenser E^4. This condenser has a large number of horizontal cooling tubes passing across it. The condensed water in both coolers finds its way into the drum E^6, at the lowest point of the system, and is pumped through the filters E^7 (part of it going through each), into the sponge box in the right hand water tank. This sponge box is arranged immediately beneath the front cover C^1, and is so constructed that it forms a kind of siphon; the sponge chamber itself is an open ended vertical cylinder, which is mounted inside a second chamber, this latter being closed at the bottom but having perforations near its upper end.

THE TRANSMISSION.

The differential gear G^3 and its countershaft are enclosed in the casing G. The cas-

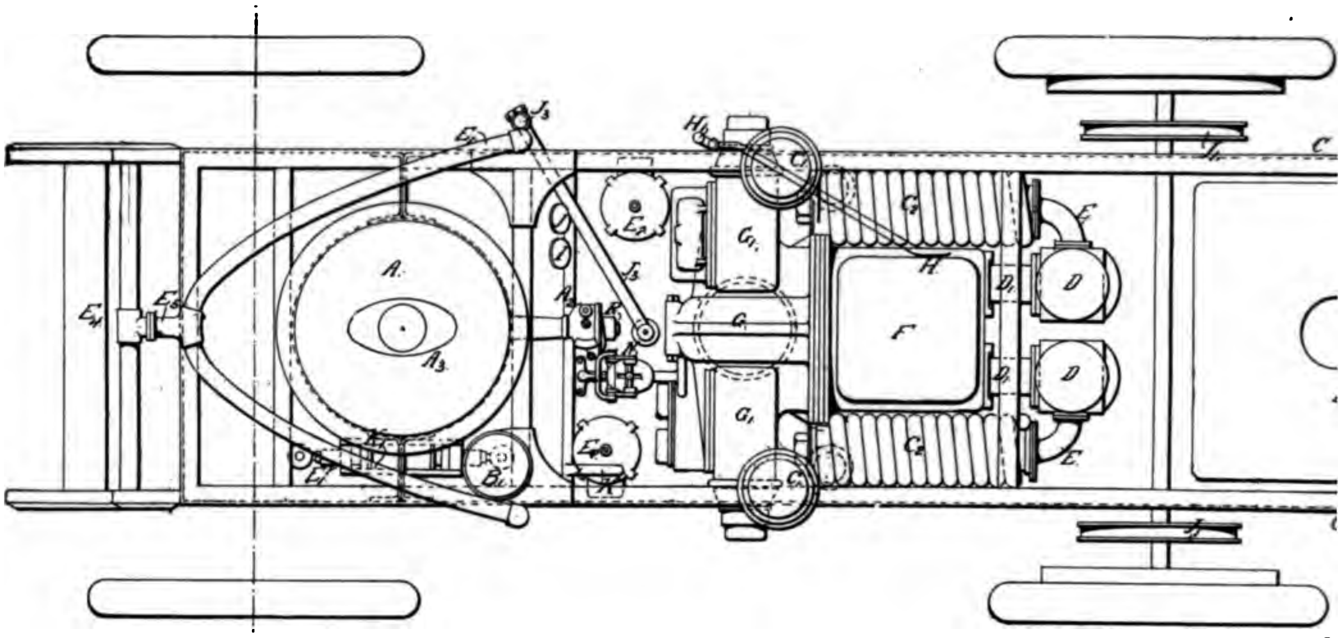


FIG. 7.—PLAN OF THE CAR SHOWING GENERAL ARRANGEMENT OF PARTS.

ing itself is made in two parts divided vertically down the centre. It provides four double ball bearings in which half inch balls are used. The differential gear is of the spur wheel type, and the shell is so made that the large phosphor bronze gear wheel G^4, through which it is driven by the engine, is bolted between the two halves. The two halves of the countershaft carry eccentric blocks, G^1, for operating four feed pumps, two on each side of the centre of the car. The shafts carry the sprocket wheels G^6 at their outer ends, and the power is transmitted from them to the rear wheels by roller chains in the usual way.

THE PUMPS.

The feed pumps which are driven from the countershaft are fixed in a vertical position beneath it, and are secured to the casing G. The design of the pumps with their valves is shown in Fig. 6. One of these pumps feeds water from the main tanks to the boiler, and another returns the condensed water from the drum E^8 to the main tanks. Both these pumps have a stroke of one inch. The two other pumps are of similar construction, but the stroke given to them is a half inch; of these one pumps the fuel from the main tank B to the pressure tank B^1, and the other supplies lubricating oil to the moving parts of the engine and countershaft. This lubricating oil finds its way from the bearings to a reservoir, G^3, beneath the differential gear, the pump then recirculating it to the various bearings.

The hand lever K, projecting upwardly from the floor, on the left, near the dial board, is connected by a system of levers with a combined water and fuel pump. The two pumps face one another, and have a common piston rod. One of these pumps can be used for forcing kerosene from the main tank into the pressure tank when desired, and the other can be used for feeding water into the boiler when the car is standing.

THE OPERATING MECHANISM.

The reversing gear of the engine is operated by means of the hand lever H, which works on a notched quadrant.

The power and speed of the engine are, as a rule, regulated by the throttle valve, but in special cases, such as when ascending steep hills, the cut-off is varied. The average cut-off is set at about one-half, and it can be varied in a forward direction anywhere between zero and three-quarter stroke.

From the footboard, in front of the driver, project two pedals, I and J, which are connected respectively with side brakes of the shoe pattern I^1 and of the band type J^1. The shoe brakes press upon the inside face of rims bolted to the wheels, and the band brakes operate upon drums which are rigid with the large sprocket wheels. Each pair of brakes is so arranged as to have a compensated action on each wheel. Under the usual conditions the engine also forms a thoroughly effective means of stopping the car. The steering lever J^2 is hinged to an upright side pillar J^3, the lower end of which carries a crank which is connected by the usual system of rods to the heads of the steering wheels.

The total weight of the car is 3,100 pounds. The average speed is 16 miles per hour. The actual quantity of oil used has been found to be about one-sixth of a gallon per car mile. The water consumption, when not condensing, has been found to work out at 15 pounds (1½ gallons) per car mile, but, as has been stated, the 34 gallons carried is sufficient to run 120 miles.

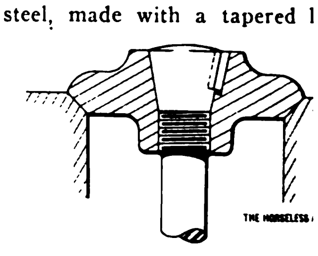
The National and Stanley Shows in England.

As was to be expected in view of the multiplicity of automobile shows in England this winter, the first two of the season, which are privately promoted shows and do not have the support of mobile organization, were rathe fairs. At the National Cycle a Show, which was held at the Cr ace, Sydenham, November 21 to mobiles were exhibited by firms, and these mostly agents f cars. In addition there were abo exhibitors of parts. Motor bic fairly well represented.

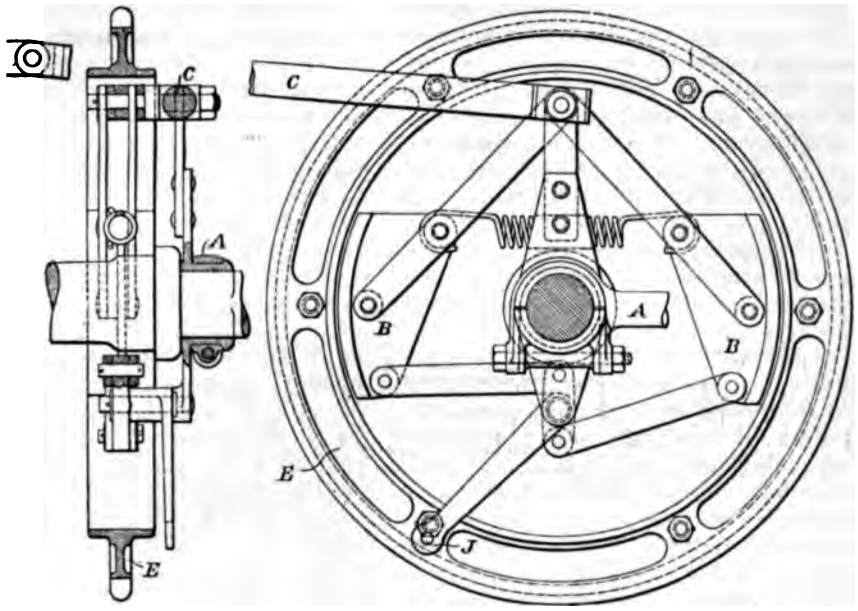
At the Stanley Show, which w the Agricultural Hall at the sa as the above mentioned show, exhibited by only nine or ten number of the cars being Amer the Oldsmobile, Rambler, Wal Prescott. Motor bicycles and accessories were shown here in la bers.

Poppet Valve Construc

In the discussion of Captain Lo paper before the Institution of M Engineers, Mr. Austin, manag Wolseley Tool and Motor Car of Birmingham, furnished the ac ing sketch of a poppet valve co employed by them. The valve of steel, made with a tapered



screwed into the valve when th at a dull red heat. It is necessa the plug a right taper and to secu a pin, as indicated in the ske Scoring of the valve on the sid the piston will occur, and it is better to lower the valve into a re firm are using a baffle plate in fr valve.



JAMES & BROWNE'S HUB BRAKE.

ames & Browne Double Acting Hub Brake.

brake herewith illustrated is em- on the James & Browne, an Eng- soline car. The brake was referred he paper by Captain Longridge on fotor Cars of 1902." It will be ob- that the brake drum is formed by rocket wheel and that the brake act on the inner surface of the The two shoes or blocks B B are ted by links pivoted to the upper a pedestal bracket rising from the xle. This pedestal is steadied by a or distance rod C fastening to a ar of the frame, as shown at D. The al bracket has an extension below le, from which extends laterally a)ver this pin slips a sleeve with lever a long arm J, by which the sleeve is upon the pin, and two shorter op- arms connected by links to the blocks. It is readily seen that if the is moved in a left handed direction l its fulcrum the brake blocks move from the axle and engage the inner : of the brake drums. A coiled between the two blocks draws them from the braking surface when the re on the lever J is released. drawing is from *Engineering*.

automobile club has been formed in n, Portugal. A series of contests for and fuel economy will be held next ;.

connection with the announcement free garage is to be opened in Lon- the proprietors hope to recoup them- i upon washing, etc.—a storage sta- nanager writes: "I hope my firm will e considered old fashioned, to render es at a fair profit upon all we do, not pretend to do anything free, for surely this is the only true business principle, and I do hope that wiser counsels will prevail and so keep up the status of the trade, and not allow it to sink into the same class of trading that gives away a present with a pound of tea."

In the next year's French models mechanically operated inlet valves will be very generally used; they have been definitely adopted by the Peugeot, Darracq, Hautier, Mors, Rochet-Schneider, Pascal and Dupressoir firms.

At Bristol, England, a preliminary meeting was held November 4 with a view to organizing an automobile club. C. Franklyn presided.

Panhard & Levassor have in construction three new models for 1903, a 16 to 24 horse power touring car with mechanically operated inlet valves, an 8 horse power three cylinder vehicle and an electric gasoline combination vehicle.

The Bishop of Bath and Wells and the Dean of Hereford have for some time past been using automobiles in connection with their clerical duties. Another eminent divine who has just purchased a car is the Bishop of Rochester.

A French firm announces that it is building a number of special racing vehicles, which it offers at cost price, and will in addition to this give a substantial rebate if the car starts, and a still further attractive prize if it wins in its class in the Paris-Madrid race, or whatever race may be settled upon by the French Automobile Club as the big race of the year.

A hill climbing contest was held by the Rheinischer Automobile Club on October 26 from Heidelberg up to the Konigstuhl. The distance was 4.6 miles, and the difference of level 1,500 feet. In the heavy car section the winner was Herr Opel on a 20 horse power Opel-Darracq (10m. 15s.), while the light car class was won by Herr Thum, of Mannheim, on a Benz (22m. 5s.).

Data of Modern French Motors.

The following table of motor dimensions and speeds has been prepared from a table published in a recent issue of *La France Automobile*:

Make.	H. P.	Speed. Rev. per minute.)	No of Cylinders.	Bore. (Inches.)	Stroke. (Inches.)	Ratio of Bore to Stroke.	Piston Speed. (Ft. p. m.)	M. E. P. (Lbs. per sq. in.)
Panhard-Levassor..	5	750	2	3.2	4.8	1.5	600	53.7
" " ..	7	750	2	3.6	5.2	1 44	650	56.3
" " ..	10	750	4	3.2	4.8	1.5	600	53.7
" " ..	12–15	750	4	3.6	5.2	1.44	650	56.3
" " ..	16	750	4	4	5.2	1.3	650	50.8
" " .	20	750	4	4.4	5.6	1.27	700	48.7
" " ..	30	750	4	5.2	5.6	1.08	700	52 4
Mors....	8	1,150	4	2.8	3.8	1.21	730	46.2
"	12	1,000	4	3.12	4.5	1.44	750	54.2
"	15	900	4	3.48	5.12	1.47	768	53.2
Buchet	4½	1,500	1	3 4	3.6	1.06	900	57.1
"	6½	1,500	1	4	4	1	1,000	53.6
"	9	1.450	1	4.4	4.8	1.09	1,160	52.9
"	8½	1,500	2	3.4	3.6	1.06	900	54
"	12	1,500	2	4	4	1	1,000	49.5
"	16	1,400	4	3.4	4	1.18	933	49
"	24	1,400	4	4	4 4	1.1	1 026	48 4
"	40	1,350	4	4.4	4.8	1.09	1,080	63 1
De Dion	1¼	1,550	1	2.68	2.8	1.06	723	32 2
"	2¾	1,550	1	2.96	3.04	1.03	785	52.5
"	4½	1,550	1	3.4	3.4	1	878	67.7
"	6	1,500	1	3.6	4 4	1.22	1,100	55.5
"	8	1,500	1	4	4.8	1.2	1,200	55
"	10	1,300	1	4 4	5.2	1.18	1,105	61.7
"	12	1,200	2	4	4 8	1.2	960	51.5
Delahaye..........	8	900	1	4.4	5.6	1.27	840	65
"	12	1,000	2	4	5.6	1.4	933	53
A. Bollée..........	8	750	2	3.92	6.4	1.63	960	35.8
"	12	750	2	4.4	6.4	1.45	960	42.6

Oil Motor Cars of 1902.

(Concluded.)

The marked economy of the Gillet-Forest motor is attributed to this method of governing. Where this method of governing is adopted, correctness of mixture would appear very necessary. For, assuming Mr. Grover's experiments with coal gas is applicable to hydrocarbons, the mean pressure is influenced not by the products of combustion present, within the workable limits, but by the correct ratio of air to gas, which alone determines the possibility of an explosion and the pressure generated.

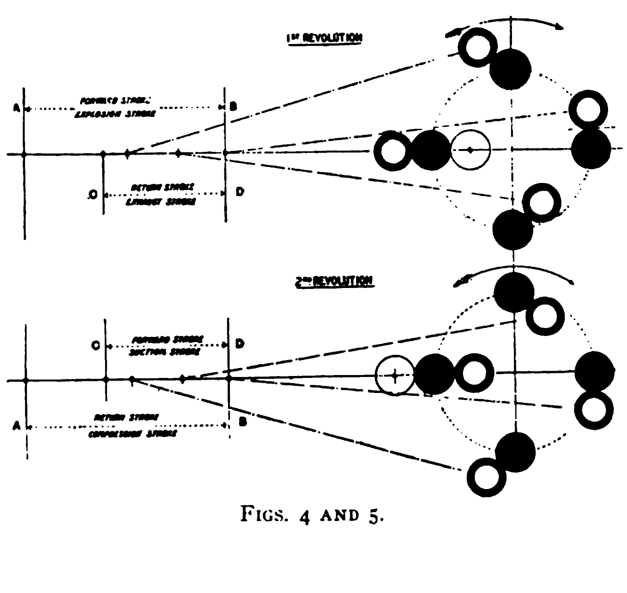
A third system, in very general use, usually in combination with one of the preceding methods, is by retarding the charge ignition. The effect of delayed ignition is to give the piston time to expand the charge, thus reducing the force of the explosion and the duration of its action on the piston. In other words, the full power value of the oil is not obtained. The method is, therefore, wasteful, and unless automatically coupled with the throttle valve, may, in the hands of a careless driver, lead to premature explosion.

The author inclines to think that the second, or perhaps a fourth, method would be the best, namely, governing by retaining the full share of air, and reducing the amount of gasoline. The methods of carburation in the De Dion, Darracq and Holyoke cars are on these lines.

CHARGE EXPANSION.

Having carried the subject as far as the ignition of the charge, there remain a few other points on which it may be wise to add a word or two before describing the application of the motor power to the car itself. The first of these points is expansion during the working stroke. As a direct object of design, no Otto cycle gasoline automobile motor on the market provides for increased expansion during the working stroke; indirectly, as a result of governing by throttling, greater expansion, under the action of the throttling, is obtained. The disadvantages of this method have already been noticed; loss of fuel value by reduced compression, negative work in suction below atmospheric pressure; and, if gain by increased expansion were in view, reduced power by the diminished weight of charge. Though it is doubtful whether in Otto cycle automobile motors any attempt at further utilization of the exhaust pressure would be successful, efforts in this direction are worth consideration. To overcome the disadvantages enumerated above, some inventors admitted a full charge to the cylinder, subsequently expelling a portion, thus giving greater expansion to the rest.

A method of procuring increased expansion by diminished charge is illustrated in motors governing on the exhaust. To reduce the fresh charge more or less of the exhaust is retained in the cylinder. The Gas Motoren Fabrik Deutz ingeniously eliminate all back pressure by giving a free exhaust stroke, drawing back part of the exhaust during a portion of the suction stroke, then closing the exhaust valve and opening the charge inlet valve for the remainder of the stroke. Taken broadly, as a principle, increased expansion by charge reduction might, perhaps, be useful in designing motors liable to temporary demands for power in excess of their normal yield, as, for instance, in hill climbing. In such case, the cylinder would be so dimensioned that a full charge would provide very high compression and increased power for use on occasions when a temporary increase of vibration, etc., would be of no consequence. For normal running, the reduced charge and lower compression would be employed. Against the advantage of this reserve power would be the slightly increased dimensions and weight of cylinders, etc. On the other hand, provision of reserve power is, with single acting Otto engines, the only way to reduce change speed gears to a minimum—a step much to be desired. Other inventors have worked in quite a different direction, seeking greater expansion by increase of the working stroke. By lengthening the sweep of the piston during the working stroke additional expansion is obtained. Such mechanical contrivances as the Atkinson linkage,



FIGS. 4 AND 5.

though undoubtedly economical, cumbersome for automobile v simple device for the purpose was designed by the author, the det worked out by A. Suggate. The cations of the stroke will be easil stood from the sketches given, Fi 5. The diagram shows teeth on pin in the crosshead to gear into wheel fixed to the crank. The pi connecting rod is lengthened bey teeth to form a bearing, worki block or roller, the latter sliding ing in a groove on the crank. Tl ing takes up much of the thrust, the teeth the work of keeping th the proper position in the cra shaft must, of course, be provid suitable bearings. From the dia will be seen how the other str varied during the cycle. Natura not suggested that such gear wou the shock of large engines, but f powers the mechanism might s purpose. The cycle itself favors e for a light charge is used with hi pression and increased expansic

The full block wheel is on th The wheel indicated by the hea is on the connecting rod. The p cles show position of the wheel connecting rod at the end of the tion. Maximum stroke of pisto equals twice throw of crank pl diameter [2] of wheel. Minimum s piston C D equals twice throw minus pitch diameter [2] of wheel.

Other inventors, again, have a increased expansion by addition ders. Excluding the system of co ing, which is not likely to be in in light automobiles, adapters of t principles have found, and oth find, a possible application to m work.

CYLINDER COOLING.

The question of what is the prop der temperature is one that admit answers, according to the st taken, namely, that of efficiency o power.

High cylinder temperature con efficiency, considered as the ratio converted into work to the total parted to the engine. Under thi then, the cylinder walls should be hot as they can be efficiently ru when power is considered, differ siderations intervene. Low cylin perature results in easier lubricati therefore, likely enough, in redu tion, a possible factor in the inc power.

MUFFLERS.

Until very recently these have b sidered merely as sound deaden their influence on engine power q looked. Many of the mufflers u thus ridiculously small, giving rise unnecessary back pressure. Wh proper volume ratio between th

cylinder the author does not
[. A. Norris states that it should imum of 5 to 1. That mufflers bly yet too small, and that con- throttle still exists, is evident fact that certain makers have the exhaust pipe between the and muffler a bypass valve, to xhaust, when more power is re-

ure immunity from fracture in ack fire, a relief valve is some- ed to the muffler.

CATION OF THE MOTOR POWER TO THE CAR.

nk and Crank Shaft.—As regards of Otto cycle motor crank shafts ce is to set the centre of shaft be- xis of the cylinder. The method to objections. The prevailing f locating the shaft line so as to the cylinder axis gives equal an- to the connecting rod on its up n stroke. The cycle, however, all the working strain during the roke; consequently, construction erhaps, aim at keeping the con- od in the most favorable position and pressure in this period of the ll that is needed to accomplish set the crank shaft in advance of of the cylinder.

question of material for crank e of the prominent firms in Eng- rmed the author that the steel ich they forged motor cranks 32.5 tons per square inch tensile that is to say, not below 30 tons ve 35 tons. Phosphorus, 0.05. nsidered this steel less liable to as a result of constant vibrations, nd jars. The author does not at with this view. He believes that l crank shafts (also connecting .) a more rigid steel, of very gher tensile strength, at least 45 s, with even lower phosphorus, is ore suitable material. For these rgings, steel of higher tensile is easily obtainable with equal nd should be specified by motor For such purposes nickel steel claims to consideration.

ywheel.—There is little to be said etail. The inertia of the flywheel the chief causes of vibration. A ical elimination of this objection- ure is in the provision of two fly- evolving in opposite directions.

tch.—The function of the friction to transmit motion from the fly- the gear. A good deal of trouble be experienced with clutches get- of alignment, slipping, acting too etc. Nowadays these difficulties stly disappeared.

IISSION FROM CLUTCH TO GEAR.

ain point noticed is the increased niversal joints at both ends of the sion shaft, so as to prevent de- strains reaching the gear.

There is an indication, however, that these universal joints will be dispensed with, and greater rigidity obtained by tying all parts to a single frame. There is no objection to a single frame properly tied, but flexibility of drive, the author thinks, should be fully maintained, if not increased. To this end he suggests the trial of flexible transmission shafts, constructed on methods illustrated by the coiled spring, the bundle of steel rods, etc.

CHANGE SPEED GEAR.

The various systems in use do not present much novelty. Four methods predominate; toothed wheels which are slid in and out of gear, gear wheels always in mesh, but fixed when required to drive by interior expanding clutches, less common, but likely to become a great deal more so; belt gear, fast disappearing; epicyclic gear, running solid for the high speed, found chiefly in light cars; lastly a link motion, by which varying throw is imparted to rods which drive the differential, on the rear axle, through reciprocating clutches.

An ingenious idea has been realized by L. Megy, of Paris. Dispensing with the hand change speed lever, he causes the speed to automatically vary according to the resistance to be overcome. The gear wheels are always in mesh, and on each of the loose wheels is a large collar or drum, inside of which is a leather disk. These disks are operated by a rod inside the shaft, and are displaced by the resistance met with by the car. Any one speed, however, can be fixed by a hand lever.

It is quite possible that change speed gears may be soon driven out of the market either by motors of sufficient flexibility or by some electric transmission of power from the motor to the driving wheels.

THE DIFFERENTIAL GEAR.

In a few cases the differential has been replaced by other arrangements. Brouhot et Cie., of France, are said to employ ratchet clutches inside the hubs of the driving wheels.

In the Swift voiturette also the road wheels are fitted with free wheel clutches of the ratchet type.

Neither arrangement would appear suitable for reversing.

In designing a differential, the pins should be of the strongest material and ample proportions, and every precaution should be taken to keep the gear free from any defect in the countershaft alignment.

SYSTEMS OF DRIVING.

The two systems of driving are the live axle and the double sprocket chain. The former seems the better mechanical job, but so far it is chiefly confined to light cars.

It is difficult to understand why sprocket chains are left quite uncovered and usually without lubrication.

STEERING.

All first class cars are fitted with irreversible steering gear, mostly of the worm and worm wheel section, or preferably the square thread shank and sleeve or nut on account of the reduced wear, which in the former arrangement may soon produce backlash.

BRAKES.

Invention is still busy with this important detail of car construction, and there is yet room for an improved brake, perhaps hydraulic, pneumatic, or magnetic. Several makers are abandoning hand brakes on the driving wheels; and, in the author's opinion, the step is a wise one. The substitute mostly takes the form of an inside expanding brake, acting on the inside of a special sprocket ring.

AXLES.

It is a strange thing that no English firm appears capable of turning out motor car axles of quality and accuracy equal to the production of French and Belgian firms. The Wolseley Company, as might be expected, make their axles from Vickers' special axle steel, but other leading firms import largely from foreign makers.

An inquiry to one of our large forging firms for an explanation of this fact elicited the reply that there appeared to be nothing in the material itself to differentiate it from the steel of this country, and that if any superiority existed it must be due to a method of hammering which was more or less a lost art in England.

The employment of weldless steel tube or hollow bored axles, which is the latest development, ought to suit British makers, and if this type of axle proves successful British made axles ought to be found on every year.

SPRINGS.

The same remark as to the superiority of the foreign made articles applies to motor car springs.

FRAMES.

Most makers are now using a longer wheel base and a broader frame, giving greater space for large, roomy bodies.

Whereas until very recently the engine and mechanism were usually carried on an under frame, and deflection provided for by universal joints on the shafts, etc., the most recent practice, illustrated in the 40 horse power Mercedes Simplex car, dispenses with the under frame and universal joints, and carries engine, bearings, gear, etc., on the main frame, which is braced and stiffened for the purpose.

As regards material, automobile frames are mostly of armored wood, stiffened or backed by girder shaped steel plates.

LUBRICATION.

In this respect there is nothing very new or noteworthy. The innumerable toy grease cups that used to adorn the mechanism of cars have been replaced mostly by sight drop feed oil lubrication. In a few cases the preferable forced or cir-

culating pump lubrication is employed. Change speed gears are generally run in oil; and crank shaft lubricating is of the splash, collecting cup or ring type.

A very usual method of crank lubrication in modern high speed steam engines is to fill the crank chamber with water to a depth covering half the crank pin on the down stroke, floating oil on the top.

So far as the author knows, the Duryea car is the only make that sensibly provides oil pad lubrication for the pins of the driving chains.

There is also another interesting point that so far appears to have escaped the attention of the chemist and the engineer—the effect of lubrication on charge firing. At certain temperatures and pressures, trouble is experienced by premature so called automatic firing of the gasoline mixture. Speaking with the reserve due to imperfect study of the problem, the author inclines to think that low flash lubricants are a cause of premature charge firing.

The practical conclusions at which the author arrives are, first, gasoline motors should be fitted with positive feed lubricators, insuring a sufficient, and no more than sufficient, oil supply; second, that with such lubricators high flash point oils should be used in preference to the oils now commonly employed. The high viscosity of such oils is favorable to the retention of compression; on the other hand, it tends to increase friction and thus also the temperature of the rubbing surfaces.

N. A. A. M. Matters.

The regular monthly meeting of the executive committee was held at the office of the association on Wednesday, December 3. The following business was transacted:

"Resolved, That a convention be called for February 14 to 21, both inclusive, at the Coliseum, Chicago, to approve a bill which will be introduced during the present session of Congress to appropriate twenty million dollars ($20,000,000), to be expended under the direction of the National Government for a national highway; this twenty million dollars to be distributed in the various States according to population, on application by any State or county, the State or county agreeing to furnish two thousand dollars ($2,000) for each one thousand dollars ($1,000) appropriated by the Government.

"Resolved, That this association adopts as its standard the following number of lugs and spacing for same on single tube tires: For rims 26 and 28 inches in diamter, five lugs, placed 25 degrees, 98 degrees and 180 degrees on each side of the valve. For rims 30, 32, 34, 36 and 38 inches in diameter, eight lugs, placed 25 degrees on each side of the valve, then 40 degrees and 50 degrees, alternately.

"Resolved, That the president appoint a committee of three to report on a plan for the examination of chauffeurs, and the issuing of certificates to them by the N. A. A. M."

STANDARDIZATION OF AUTOMOBILE LAMP BRACKETS.

The secretary was instructed to inquire fully into this matter.

NATIONAL LICENSES FOR AUTOMOBILE DRIVERS.

"Resolved, That the National Association of Automobile Manufacturers petition the Senate and House of Representatives to prepare, at the earliest practicable date, a bill providing for a national license to drivers of automobiles which will permit interstate commerce to be carried on without the inconvenience which would result from local licenses to automobile drivers."

"Resolved, That J. Wesley Allison be appointed a committee of one to call upon the Senators and Congressmen and ask their action at the earliest possible date."

The following firms were elected to membership: Active—Apperson Brothers Automobile Company, Kokomo, Ind.; Cadillac Automobile Company, Detroit, Mich. Associate—The Dow Portable Electric Company, Boston, Mass.; Ralph Temple & Austrian Company, Chicago, Ill.; J. M. Quinby & Co., Newark, N. J.; The Electric Storage Battery Company, Philadelphia, Pa.

The Chicago Show.

The latest additions to the list of exhibitors at the Chicago Show, to be held February 14 to 21, are the following: St. Louis Motor Car Company, Chicago Motor Cycle Company, Bartholomew Company, Porter Storage Battery Company, Pope-Robinson Company, Westinghouse Company, Fisher Automobile Company, Dow Portable Electric Company, Champion Manufacturing Company, Salamandrine Boiler Company, Western Motor Company, Dayton Electrical Manufacturing Company, Baldwin Chain Manufacturing Company, American Roller Bearing Company, Brown-Lipe Gear Company, Midgley Manufacturing Company, Cleveland-Canton Spring Company, Otto Konigslow.

The management expects to secure reduced railroad rates, as usual, from the passenger associations. A smoker, in honor of the visiting members of the trade, will be held Thursday evening, February 19. It will be a purely informal affair, to which all visitors will be invited.

The N. A. A. M. has decided to hold a good roads convention at the Coliseum, February 14 to 21 inclusive, to approve a bill which will be introduced in Congress providing for a large expenditure for a national highway.

The Cannon Racer Remodeled.

George Cannon has remodeled his steam racer into a road machine by adding a regular body. The vehicle can be changed from racer to road machine and vice versa hours' time, it is claimed, by onnecting the throttle wheel and unscrewing the by-pass a gauge unions and steering wheel removing a few bolts the bod lifted on and off the frame. the only parts that fasten to the l ter removing the body, when str racing, a short steering post and the by-pass rod and throttle so arranged that the engineer c them from the rear seat. Tl sprocket is, of course, also chan

Automobile Acciden

An automobile belonging King, of Stanhope, N. J., was by fire near the Lake Hopatco about two weeks ago.

A steam delivery wagon caug Paterson, N. J., December 4. Th succeeded in turning off the ga no serious damage was done.

Between Milford and Westhav on November 23 an automobile G. E. Sykes, a Yale student, wa overturned and set on fire. The tried to avoid a collision with a In the darkness he veered the ma the ditch.

A fire occurred at the Automo age and Exchange Company's de High street, Newark, N. J., De caused by the explosion of a ca line from which one of the empl filling the tank of the motor wa man who was handling the liqui with a few painful burns about and arms.

The New York *Herald* repor Clifton, N. J., on December 4, mobilist ran into a horse vehi by Morris Jackson, of Paters horse ran away and Jackson hurt. The automobilist refuse the injured man in his autom would have been treated rough populace had he not made his e

Trade Literature Recei

Machinists' Tools and Drop F Catalogue of the Billings & Spe pany, of Hartford, Conn.

A Treatise on Sharpening and Milling Cutters, Reamers and Ot —The Cincinnati Milling Mach pany, Cincinnati, Ohio.

Dixon's Graphite Facings (for —Joseph Dixon Crucible Con Jersey City, N. J.

To Boston on a Mitchell.— Wheel Works, Racine, Wis.

The Cadillac Gasoline Aut Cadillac Automobile Company, Mich. (265 Jefferson avenue.)

Jump Spark Coils.—Fische Manufacturing Company, of Ohio.

Light Mobile Runabout.—Mo pany of America, Kingsland Po Hudson, N. Y.

"The Economy of the Packar ard Motor Car Company, of Ohio.

NOR ENTION

mber of exhibitors for the Madi-
re Show has reached 122.
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will concentrate its motor cycle
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Martin, 523 Fifth avenue, has
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Duryea gasoline cars.
blic automobiles running between
and Pennville, Ind., now carry
to several post offices.
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142 and 144 North Broad street,
ia, by Percy L. Neal.
st automobile delivery wagon in
a., has just been placed in serv-
Clinton Steam Laundry.
ober the exports of automobiles
amounted to $122,624, compared
the same month last year.
omobile service will soon be
tween San Angelo and Sonora,
ound trip will be made daily.
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l be placed in service between
and Sevierville, Tenn., shortly.
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517 in our issue of December 3
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Post Company, Adrian, Mich.,
ge of putting their automobiles
ail routes out of Adrian.
illman will engage in the manu-
new form of automobile wheel,
rovided with double solid rub-
t Manchester, N. H.
ton Machine Company have
it against the Champion Manu-
Company, of Brooklyn, New
alleged infringement of patent. The Champion Company state that they will defend the suit and protect their customers.

The Automobile Club of America has received a letter from Alexander Winton, Cleveland, in which he offers to represent the club in the coming Gordon Bennett race.

The Wheeler Manufacturing Company, of Detroit, Mich., were visited by fire November 26. They report that they will not be delayed more than ten days in their business.

A company for the manufacture of automobile engines and motors has been formed at Middletown, Ohio. Joseph Iseminger is president and John McAdams manager.

According to the Kobe (Japan) *Chronicle* a Duryea surrey has just been delivered to C. F. M. Nickel, of that city, by Messrs. Bruhl Frères, the automobile agents of Yokohama.

Secretary Unwin, of the N. A. A. M., states that efforts are being made to secure reduced railroad rates for the New York Show, but there is little hope for success in this direction.

The factory of the Singer Manufacturing Company, South Bend, Ind., is for sale. It comprises a machine shop building, 40x430 feet, three stories and basement, and several smaller buildings.

Barney Oldfield, with the Ford-Cooper racing machine, made new track records at Detroit, Mich., last week, for 1 and 5 miles. The new time for 1 mile is 1m. 1 1-5s. and for 5 miles, 5m. 20s.

Dr. A. H. Pierce, of Leominster, Mass., claims to have been the first to reach the top of Mt. Wachusett in an automobile, in July, 1900. The feat, it appears, has been duplicated recently by K. L. Grout.

A dispatch from Redding, Cal., states that a double automobile road between McCloud River and Shasta Springs, on the Southern Pacific Road, in Shasta County, is well under way and will be ready next spring.

J. J. Williams, Montpelier, Vt., has built a gasoline carriage with an opposite cylinder 4½x5 inches engine. Carriage weighs 1,750 pounds and has run as high as 30 miles per hour, taking all ordinary grades on high gear.

A Mexican paper states that a group of Mexican and American capitalists, residents of Mexico City, have organized a company with a capital stock of $200,000, for the purpose of manufacturing automobiles in their city.

The Gainsborough (Lincolnshire, England) rural district council has adopted a motion supporting another council to make an appeal to the Local Government Board to reduce speed limit of automobiles from 12 to 10 miles an hour.

Dr. A. C. Benedict of Yonkers, N. Y., has designed and had built an improved carburetor which is adjustable from the seat and receives warm air after running a few minutes. It is closed in starting and then adjusted for the strongest explosion.

Future British official time records will only be taken by ten days' previous notice of time and place being given to the Automobile Club. It is also notified that the rules governing races and competitions will be entirely revised at the earliest opportunity.

The Colorado Automobile Company, capital stock $50,000, principal office Denver, has been incorporated to operate in Denver and El Paso counties. The directors are George W. Wood, M. W. Gano, Frank R. Ashley, Alvin B. Daniels, Lewis Lindahl.

The next "German Automobile Exhibition" will be held in the "Flora" Building, in Charlottenburg, near Berlin, March 1 to 15. The exhibition will be under the auspices of the German Association of Automobile Manufacturers and the German Automobile Club.

Kenneth A. Skinner, of Boston, is reported to have made a trip from that city to New York and back recently in a total time of thirty-five hours. He left the Hub at 3 a. m. on Friday, the 21st ult., and returned at 2 p. m. the following day, having left New York at 8 p. m. on Friday.

The Fischer Special Manufacturing Company, of 229 West Sixth street, Cincinnati, Ohio, are manufacturing a jump spark coil put up in an oak box. The coils are made either with or without vibrator and a condenser is connected across the contact points to insure sparkless running. The coils will give a ⅝ inch spark in the atmosphere, it is claimed.

George M. Brown, of Hartford, writes that in touring he has had some trouble in obtaining good lubricating oil, and now when starting on a long trip, if he cannot carry enough along, he has it shipped ahead. He adds that when the leading repair stations keep springs and valves for the different leading carriages touring will be minus many of its present annoyances and delays.

The latest official list of exhibitors at the Madison Square Garden Show contains the following additional firms who will have space in the exhibition hall: O. H. Keep, Jr., 1147 Broadway, New York; American Chocolate Machinery Company, 49 West Sixty-sixth street, New York; Whitney Automobile Company, Whitney's Point, N. Y., and Backus Water Motor Company, of 178 Pennsylvania avenue, Newark, N. J.

Announcement was made in Philadelphia December 1 of the proposed formation of a large combine in the rubber industry, to be known as the International Rubber Company, with a capital of $25,000,000. The incorporation papers will be filed at Trenton, N. J. The new company is said to be backed by Pittsburg, St. Louis, Chicago and Philadelphia capitalists. It is said to be independent of the company now controlling a majority of the rubber factories in this country.

The Motor Cycle Trade in Great Britain.

United States Consul General H. Clay Evans, of London, has sent in a report on the above subject which appears in the advance sheets of Consular Reports for November 25. The reports states that the motor cycle trade in the United Kingdom is a matter of only two years growth and that in this new business there is every reason that the American manufacturer should participate.

While there is, popularly speaking, a boom in motor cycling and there are over a score of machines on the market, the majority is of French or Belgian make, and a number that are advertised as English machines, with English names, are either imported outright or consist of Continental motors built into English frames by local companies. There are probably half a dozen machines that are really English built throughout, and of these only three—the Singer, the Enfield and the Humber—are the product of big factories that have previously made a reputation in the cycle business, and have now turned their attention to motors, owing to the popular demand. America is already represented in the market by three standard machines, the Mitchell, the Orient, and the Royal, all of which, it may be said, compare favorably with the best English and Continental makes. There is still room, however, for the American manufacturer who will cater to the demands of the English rider.

Belt driven machines are still vastly in the majority, despite certain obvious disadvantages of the system; though, curiously enough, among the high grade English machines the Singer is gear driven, and the Humber has a chain drive with a spring clutch for taking up the starting strain of the motor. The high tension electric ignition system, with coils and accumulators, is almost universal, though the Singer has an electro magnetic ignition device which works very satisfactorily.

Excessive weight is the most objectionable feature of the prevailing type of machine. Those most commonly seen average 100 pounds. One of the standard road machines weighs 120 pounds, while the track racers, though they hardly deserve to be classed with the popular motor cycle, reach as much as 250 or 300 pounds. The lightest practical road machine is the Clement-Garrard, a French product. The motor set complete weighs only 21 pounds, and is built into an English frame by a company in Birmingham, the machine scaling 65 pounds, all on.

The principal difference between the English and American machines at present is that the English are belt driven instead of chain driven or direct geared. The motor is frequently merely clamped into the diamond frame of an ordinary bicycle instead of being built into a special frame. *It is only fair* to say, however, that a number of special frames are now being designed with a special view to standing up under the increased weight and vibration of the motor. Accumulators are favored as against dry batteries or electromagnetic ignition. The standard horse power up to date has been 1¼; but new machines are being constantly turned out with engines of from 1¾ to 2½ horse power to meet the demand for greater hill climbing power. It is generally conceded that the very high powered wheels are wasteful of fuel and subject to excessive vibration on the level, and that the ideal machine will be one with a light and comparatively low powered motor, but with a two speed gear that will insure good hill climbing power.

In spite of the English speed limit of 12 miles per hour, the English motor cyclist demands a machine capable of a good 20 miles on the level, with ability to keep it up without danger of overheating.

It must be borne in mind that the English purchaser, while he is able and willing to pay, demands first class material and workmanship for his money, and the surest way to spoil a promising market is to try to tempt him with anything less than the best, either on the score of cheapness or attractive appearance.

Of course, in its present state of development the motor cycle is undergoing constant change and improvement. There is no machine on the market that can claim to combine all the desirable features. But there are several points that might well be kept in view by a maker who wants to produce an ideal wheel for the English trade. Weight should be maintained as low as is consistent with effective working. A 50 pound wheel at the present juncture would command practically its own price. A thoroughly effective chain or gear drive, obviating the constant belt troubles that now worry the rider, would soon make its way, in spite of the popular idea fostered by many makers that the belt drive is the only effective and practical form of transmission. A simple two speed gear, giving 20 miles an hour on the level, with the ability to take grades of one in seven without pedal assistance, is in great demand and is not forthcoming. A light weight but reliable form of electromagnetic ignition would win its way against the now popular accumulator system. The trouble with the present magneto systems is that they will not endure the constant vibration. Ample mud guards are always demanded, preferably with an overhang beyond the front fork. English road riders have to contend with a large percentage of rainy weather, and they will cheerfully face rain for the sake of a ride, so that good mud guards are essential. The gasoline capacity of the machine should be at least 100 miles. Single lever control of the gas and electric sparking devices has been tried and proved both effective and popular. Anti-vibration seat posts and handle bars are absolutely essential to comfort, and, while there are good devices of this sort on the market, I believe there is at [...] no machine turned out from the [...] with them. Another feature stron[...] manded by riders, and not yet sup[...] either a comfortable spring footre[...] swing back pedal that will do aw[...] the cramped position incident to [...] the feet on fixed pedals during a lo[...] Finally, prompt delivery is of gr[...] portance, as there are but few of [...] chines on the market that can be [...] by the makers from stock.

The Clement-Garrard is a Frencl[...] weighing only 21 pounds, built [...] English frame by the Garrard Man[...] ing Company, of Birmingham. [...] complete, 65 pounds. It is belt driv[...] high tension electric ignition. Tl[...] pany is putting out a chain driv[...] chine for next season.

The Werner French motor [...] prominent place at present in the [...] trade. The motors are sometin[...] ported and built into English [...] though the larger number of thes[...] are French built throughout. They [...] belt driven with the usual high [...] ignition.

The Enfield is another type of [...] machine manufactured by the Enfie[...] Company, Redditch, England. [...] horse power motor is mounted [...] steering head, giving an extra l[...] drive. It is understood, however, [...] company's next machine will carry [...] gine inside the frame. Gasoline ta[...] accumulators and lubricating reser[...] all carried in the large metal cas[...] the diamond. Price, $255. The san[...] pany makes a 2¾ horse power tri[...] $383 and a 3½ horse power quad [...] The higher powered engines ar[...] cooled.

The Singer is a strictly English [...] by the Singer Company, of Coventr[...] peculiar in having the whole of th[...] mechanism enclosed in the driving [...] The bicycle motor is of 2 and 2[...] power, and the machines are e[...] good hill climbers. A spare gasol[...] can be carried in the frame, givin[...] pacity of nearly 200 miles. The [...] the bicycle is $340.

Other popular machines are:

The Rex (English) 2 horse powe[...] and gasoline tank carried inside [...] belt drive; front fork strengthened [...] line capacity, 100 miles; price, [...] weight, 100 pounds.

The Minerva, a typical Belgian [...] which is imported and built into [...] of English frames; made in 1½ [...] horse power; uses belt drive and [...] accumulator ignition.

The Royal Sovereign, an Engl[...] chine of conventional type; 1½ [...] power motor and gasoline tank ca[...] side the frame; drives from a twis[...] hide belt; maximum speed, 30 n[...] hour; price, $168. London Ma[...] Company, High street, Kingslan[...] don, N.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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HE HORSELESS AGE.

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Steam Carriages in Winter.

: has been stated repeatedly by corre- ndents in recent issues of THE HORSE- s AGE that in winter, and particularly xtremely cold weather, the steam car- ge is at a disadvantage, owing to the ger of its freezing up. While this im- sion is undoubtedly a correct one, it ld seem that this disadvantage is not erent to the motive power and could overcome if the subject were given per thought. Steam locomotives are in use all the year around in the most north- erly countries to which civilization has spread, and if the water can be kept from freezing in them there appears to be no reason why, with correct design in this re- spect and proper care in operation, a steam automobile cannot also be kept from freezing.

As a matter of fact manufacturers have so far given little thought to any other than pleasure automobiles, and these are rarely called upon for use when the thermometer hovers around zero. There is, therefore, no need of paying much attention to means of preventing freezing in a pleasure vehicle. But as the field of practical use for automobiles extends, the problem of an all the year around machine gains in importance, and in connection with steam carriages the freezing question undoubtedly takes first rank. Steam vehicle engineers will, therefore, do well to attempt to eliminate as far as possible the danger of any part of the vehicle freezing up while in use.

Motor Sleighs.

We would remind inventors of motor propelled sleighs that now is the time to bring forth such inventions and demonstrate their practicability to the public. This notice may seem unnecessary, but it is nevertheless a fact that we have been accustomed to hear of inventions along this line toward the close of the season, when interest in such devices is naturally at a low ebb.

If, as seems to be the case, the danger of skidding on snow covered ground is one of the greatest obstacles to the successful use of the automobile during the cold season, the motor sleigh, with which this danger could be avoided, would seem to meet a practical demand.

Sleighing is generally considered one of the most attractive of pastimes, and there is apparently no reason why motor sleighing should not be as much superior to horse sleighing as motor driving is to horse driving. A motor sleigh could certainly be made more comfortable. Of course, in the greater part of the country the sleighing season is short; but in the Northern States, and particularly in Canada, there is a continuous sleighing season lasting for months. The possible business in motor sleighs may be expected to attain the same proportion to that in motor wagons as the business in horse sleighs bears to that in horse wagons. That is to say, the possibilities of this branch of industry are considerable, and it deserves the attention of manufacturers and inventors.

Pneumatic and Hydraulic Transmissions.

We continually receive inquiries as to what would be the objections to one or other of the above transmission systems for use on gasoline automobiles. It may be stated, to begin with, that although experiments have been made along both of these lines, there are today no automobiles manufactured employing such transmissions.

The idea of the application of such transmissions undoubtedly originated from their use in stationary work. Power transmission by compressed air is, of course, very common in railroad shops, in mines, in tunnel construction, etc., and hydraulic transmission is also employed to a limited extent, chiefly for operating small motors for domestic purposes.

It is hardly necessary to say that transmission of power on an automobile from the motor to the driving wheels is an entirely different problem from transmission over considerable distances in stationary work. In the former case a readily varied transmission ratio and light weight and compactness are the most essential factors, while none of these, as a rule, counts very much in stationary work. So much has been said about defects in the transmission gears of gasoline carriages that an impression prevails that almost any substitute

would be an improvement. This impression is erroneous, however.

What we recently said with regard to electric transmission for gasoline carriages applies almost without exception to hydraulic and pneumatic transmission. The disadvantages are even greater in the last two cases, for the reason that electric machinery is, generally speaking, much more efficient than either pneumatic or hydraulic motors. As has been said, a transmission gear of the sun and planet type for a 5 horse power motor weighs only about 100 pounds, and is used comparatively little. It is evidently impossible to build an air compressor, storage tank, pneumatic motor and connecting pipes and controlling means of the same power capacity and the same flexibility to weigh as little as this gear. Here, again, it must be borne in mind that hydraulic or pneumatic transmission is not substituted for mechanical transmission, but is added thereto, since the transmission motors could not well be built into the wheels, and gearing would have to be employed between wheels and motors. The transmission efficiency would necessarily be very much lower than is now obtained with direct transmission on the high gear.

Interchangeable Bodies for Motor Trucking.

In machinery installations the cost of production per unit of output is largely affected by the regularity of use of the machinery, the lowest cost being obtained if the plant is operated continuously all day long at full power. When the machinery is idle certain factors in the cost account continue to pile up, such, for instance, as interest on capital invested and what might be called "time depreciation" of the apparatus, due to advances in construction. This condition is particularly influential in the cost of electric light production, it being found that the average daily output of many central stations during the summer season is equal to the full capacity of the plant for only about two hours' time.

The same condition prevails in transportation, and the problem, therefore, confronts the manufacturers of motor goods vehicles and the users of such vehicles, how to reduce the periods of idleness to a minimum. In motor trucking the periods of idleness of the vehicle are essentially the times of loading and unloading. In motor haulage by traction engines the trailer vehicles are, as a rule, uncoupled from the tractor when they are to be loaded, and the engine is employed to haul another train while the loading is going on. Thus only the comparatively cheap trailers are standing idle during the period of loading and unloading.

Attempts are now being made to adopt a similar system in motor haulage with steam trucks; that is to say, to avoid the idleness of the truck during a considerable period of loading. To this end interchangeable bodies are employed, which by means of a system of platform slips can be taken from the truck in a moment's time, and, after being loaded, can be replaced in a similar manner, the truck having meanwhile been used for other work. It is obvious, of course, that this system can only be used for work between definite stations equipped with means for handling the bodies.

Doctors' Number.

Contributions continue to come in for our Doctors' Number from all parts of the country, and we can assure our readers that the subject of the physician's use of automobiles will be covered thoroughly in this number. The manuscripts already in hand cover experience with all three motive powers in medical practices in city, suburban and country districts, some extending over a period of more than three years.

We wish to state that the number will be well illustrated with half-tones of physicians' automobiles, every type of motor vehicle that has been used for the purpose in this country being shown. Besides, the illustrations will comprise a number of drawings of improvements devised by doctors themselves, houses for storing vehicles in the country, etc.

An issue of 7,000 copies has been guaranteed, but the actual issue will be considerably larger, as orders are coming in with every mail.

Automobiles in Sleet and Slush.

New York city has just passed through a rather severe sleet storm lasting for several days, and traffic of all kinds has been greatly impeded, except, apparently, automobile traffic. One morning, a few days ago, the streets, walks, etc., were completely covered with a layer of ice an inch or more in thickness. The elevated third rail system was completely paralyzed and surface street car traffic much delayed. Horses slipped and fell everywhere, and thousands of dollars of loss must have been caused through the general embargo on traffic. A few days later, w streets were covered with several i packed snow and still very slipper teams were generally employed loaded wagons.

This occurrence reminds us th traffic is not nearly so immune to conditions as is usually supposed. heat and extreme cold both imp traffic, sometimes rendering it alı possible.

Whatever may be said in regar limitations of the automobile weather, the average automobile ii city streets is at present much mc pendent of blizzards and sleet stoı the horse. This has been quite con proven on one or more occasion each of the last several winters. the late storm, when horse tra much reduced, in quantity as we speed, automobiles could be seen about at their usual speed and in numbers as customary at this tim year without apparent difficulty. tric cabs continued their service patronized more than usually, owi uncertainty of horse cab service un conditions. No doubt many of th still regarded the automobile as a a toy somewhat changed their when they saw these vehicles gli as on a summer's day under condit proved almost fatal to horse tra doubt automobiles can be made s independent of weather conditi good roads). But improvements direction are still needed.

The Paris Exposition

The annual exposition of the Au Club of France was opened on We December 10, and is to contin Christmas. The exposition was ho the visit of the President of the on the official opening day, and, to the telegraphic accounts of th papers, the event was drawing tention in the French capital and to become even a more brilliant than the shows that have prec These same accounts also enumer "special attractions," or what the would call the *clous* of the exposit as it is evident that the reports w ten at the very moment the ga opened, it will certainly be best until a later date to speak of the HORSELESS AGE is represented at by a staff of French and Americar

shall have a most thorough account
:vent, and particularly the novelties

cal Winter Use of Automobiles.

By Harry B. Haines.

question of the use of the automo- winter time, and, in fact, as an all und carriage, is fast becoming one mount importance and is a subject automobile owner or manufacturer ord to slight.

: horseless vehicle is to succeed the n every sense of the word, it must to perform its functions in exactly ne weather conditions as does its oted predecessor.

o the present time the automobile n principally a fair weather pleasure , and such of them as have been r business purposes have been pam- nd petted in a sense and never sub- to the rigorous work that falls to are of the truck team. Rainy day ons have been overcome by the top, curtains and boot on the lightweight uts, while the touring cars have tted with canvas tops, inclosed in nt with a large sheet of glass, and s proven to be very satisfactory to the passengers and keep them dry, : conditions of winter use have not been met to any great degree and serving of the very greatest thought nsideration.

year I used my gasoline runabout ing the winter, and I intend doing he future, as the vehicle is a valu- djunct to my business—newspaper on a local daily—and has proven of assistance to me in covering assign- in suburban districts.

greatest obstacle to satisfactory : from an auto in winter is of course ow, but the question of water freez- also a drawback. It is this that the steam carriage undesirable, for : all the packing of gauges and pipes ie returning of the hot exhaust into ater tank, when the thermometer gets the freezing point and to zero it is question of an hour or two before e aqua pura is transformed into a amp which refuses to be pumped into iler.

re are, of course, a great many days winter that a steam carriage will do : on, but it cannot be taken out day, and consequently it does not ther fill the bill in taking the place faithful old nag.

ı same freezing question applies to ne vehicles which are cooled by wa- rculation, but to a great extent this ion can be overcome by the addition ı-freezing solutions now on the mar- It is, of course, self evident that the oled motor is the ideal propulsive for a winter machine, as there is ab- ly no water to freeze up and nothing to be overcome in the way of difficulties, except making the motor "mote" and then devising a means by which rubber tires can be made to grip on a snowy or icy road and force the carriage through the drifts and over the slippery pavements with as much reliability as a horse drawn vehicle gets about.

In my experience I have found the present automobile rather a dangerous "animal" when it comes to ice covered asphalt or brick pavement, for under conditions such as this the skidding question pops to the front and the operator is almost constantly in danger. All drivers of automobiles in the city have experienced the sensation of skidding and know what the feeling is to suddenly find the machine whisp around in a circle and get totally out of control. When the brake is applied quickly while a machine is traveling over wet or muddy asphalt, at even a moderate rate of speed, skidding is imminent. It is a well known fact, demonstrated time and time again by costly experiences, that when a machine once starts skidding it cannot be stopped until its momentum is exhausted, no matter how much the operator manipulates his brakes or his clutches.

There is no combination equal to ice and rubber when it comes to an absolute absence of tractive force, and so it may be seen that the slipping of steering and driving wheels is one of the most important of the many obstacles to winter driving.

SOME WINTER EXPERIENCE.

Last winter more than once, when I had driven my machine into even a small drift alongside of the gutter and let it stand for a short time, I was unable to make the machine pull itself out of the slight depression and on to the centre of the road. The wheels insisted on spinning around, the smooth rubber tires grinding down the snow or slush until it formed a hard, icy bed, but not moving the machine a foot. Reversing or going ahead, it was all the same, and it was finally a case of getting out of the auto and requesting some accommodating passerby to give me a hand to shove the car out of the gutter. At such times as these I invariably stood alongside of the auto and threw in the gears to make the engine help draw the machine along, but even then it was often a hard job to get started.

When unable to get assistance in places not in the centre of the city I have often been forced to spread out my lap robe, much the same as a driver of a horse ties up the animal's hoofs in bags, and then let the driving wheels run over the robe, which generally gave them hold enough to start. Even after getting going, when running over snow or ice, at least 20 per cent. of the power is lost by slippage of the driving wheels, and when it comes to a hill the average is much higher.

ROPING TIRES.

After many vexatious experiences I finally found that if I wanted to get any sort of use at all out of my machine when the ground was covered with snow I would have to get tires that would grip better than the ones I had, or devise some means for making those on the machine get a better hold. I finally decided that the latter means was the most practical and at the same time the most inexpensive.

I had often seen punctured tires roped on the rim and run home in that fashion, and I saw no reason why an unpunctured one could not be treated in the same manner. I secured several yards of ordinary clothesline rope and bound up both wheels with it, winding the rope around the tire and rim between each spoke, until there was only about 2 inches of rubber exposed between each lap of the rope.

Fixed up in this manner I started out one morning after a fairly heavy snow storm, and was surprised to find how much better the machine acted. It went at a higher rate of speed, and the slipping of the wheels seemed to be practically overcome.

The rope binding also gave the tires a grip when starting from a standstill, and although the snow filled up the spaces between the rope considerably I found that they held very well despite that. It was also noticeable that the machine did not have as much of a tendency to skid and slip, and responded to the brake much better, not cavorting over the whole street when I tried to stop, as it had done before.

The use of the rope in this way is no doubt an old practice, but I consider it a good one. Each binding of rope would last from a week to ten days, and then it would be necessary to take off the old rope, which was by this time generally badly worn, and tie up the wheels again.

Although the rope wore ridges in the tire I did not find that it cut to any extent, and I believe that it prevented many punctures and cuts from the sharp, icy particles which cover all roads in winter.

DID NOT TAKE PRECAUTIONS AGAINST FREEZING.

Despite the fact that I ran almost every day last winter I was able to get along without adding any non-freezing solution to the cooling water in my machine. I believe that this was due to the fact that I never allowed the machine to stand still for more than half an hour or forty minutes at a time, and if I was compelled to do so I generally came out after the first half hour and started the motor, allowing it to run slowly with spark retarded and gas cut down in order to keep the water in circulation.

The amount of low gear work necessary over snow covered roads is generally enough to warm up the water almost to the boiling point on even a very cold day, and it would take some time to reduce it from 212° Fahr. to 32° or lower.

I only had one experience of freezing up my machine, and that was after one cold

night, when I was out rather late and left the carriage in a friend's stable instead of taking it to the warm repair and storage station. I did not want to use the machine next morning, and in the afternoon I went to get it, and in turning over the motor to start noticed that the thing moved very stiffly. I did not think of its being frozen up and put my whole strength and weight on the starting crank, with the result that for a moment the motor refused to move, then something snapped and then it turned over very easily.

It then occurred to me that the water might be frozen, and upon removing the cap from the water tank I found it to be a solid mass of ice. The next move was to hunt about and find out if I had broken the water circulating pump. I removed the seat cushion and peered anxiously inside to see if the wire connecting the drive on the engine to the pump was intact, knowing that if it was the pump was broken and rendered useless. Much to my relief I saw the connecting wire twisted and snapped in half and I knew that the pump was not broken.

The next move was to thaw out the water tank, pump and radiating cooler, and this proved to be a rather lengthy job. I was compelled to smile sweetly upon my friend's "kitchen canary" and induce her to boil me several kettles full of water, which she did with more or less good grace, and finally, after an hour's work, I had about cleared out the ice. I happened to have a new connecting wire for the pump in the tool box, and after putting it in I was ready to start, but that was as far as it went.

STARTING A COLD MOTOR.

The starting question on a cold winter morning is also a rather vexatious one and means plenty of service at the starting crank, unless you happen to catch on to a few of the tricks of the trade. I had raised quite a prodigious muscle grinding at the motor crank before I caught on, and now I generally do a little preliminary work before I start turning.

I have found that when the motor is cold it is a good thing with my machine—which is fitted with a suction screen and a gasoline pump—after pumping a few times by hand to soak the suction screen with gasoline, and then, if she doesn't start after a reasonable amount of effort, to take out the spark plug and heat the end of it above the thread which screws into the explosion chamber opening. This is done by holding it over a gas jet, or, if there is no gas handy, by soaking a piece of waste with gasoline and using the heat generated in that manner to warm the plug. Care must be taken not to melt off the spark plug points.

The hot plug and the gasoline on the screen combination have generally proven all that was necessary to start my motor and have saved me much hard work at the starting crank, for which I am of course duly grateful.

My experience has taught me that after the snow has fallen to a greater depth than a foot the best place for an automobile is in the storage station or some other convenient spot off the streets. The ordinary gasoline machine does not take kindly to miles of going on its low speed gears, and when the snow is deep it is generally impossible to make progress on the high speed, and if the requisite power is at hand the snow has a tendency to pile up under the steering wheels in a manner that makes it highly difficult to guide the auto.

Turning corners in deep snow generally means piling up a drift out of which the machine can hardly crawl, and when a hill is met it is generally a case of get out and walk.

In big cities the automobilist may take advantage of the trolley tracks, which are generally swept clean for the passage of the cars, but when he comes to turn out of the tracks he gets in trouble, for a deep snow drift is indeed a bugaboo of no small proportions.

I once had the "pleasure" of getting stuck tight and fast with the front wheels of my machine on one track and the rear wheels on another, and I blocked trolley traffic for fifteen minutes until the crews of half a dozen cars, which were stalled, condescended to come out into the snow and help me push the auto out of their way.

It is highly proper to state, without saying anything disparaging of the automobile, that it is not a winter carriage as yet, by any means. It would be if the question of deep snow did not enter into the matter, but sadly enough it does.

It is evident that in the designing of natural phenomena the practicability of the automobile for winter use did not enter into consideration at all, and as it is a fact and not a theory that confronts the manufacturers, it is up to them to devise some means of overcoming the difficulties which nature insists on piling up at certain times of the year.

An all year round carriage, to which all roads are alike, is akin to the airship and still a matter for future study and consideration.

As it is the automobile is a good and a grand institution, worthy of the loyal support and patronage it is receiving, and although every owner dreams of an ideal machine, he is willing in the horseless vehicle question, as in most others, to come down to earth and put up with what there is and make the best of it.

A Jaw Breaking Report.

A German automobile publication reports that in the New York-Boston Reliability Run (to which it refers as a "Betriebssicherheitswettbewerb") "all the seventeen vehicles secured the minimum number of points obtainable; all seventeen thus qualified for the president's cup." A little greater accuracy would be desirable, even at that distance.

Motor Power Formulae—E
of Compression.

By L. Berger.

TWO CYCLE ENGINES.

In comparing motors of equal
bore and piston stroke, of equal
dimensions and running at the sam
it will be seen that the following
tions insure maximum power. In t
olutions the motor must—

1. Draw in as large a volume of
as possible.
2. Compress it highly.
3. Retain the least amount of bur
in the combustion chamber.
4. Work with the greatest expansi
sible.

Generally speaking, every style
plosive motor built up to the pres
been deficient in one or two of th
spects. The four cycle engine ful
aggregate of these requirements
well.

A certain form of two cycle en
built with two cylinders, suction an
pression taking place in one cylin
ignition and expansion in the other
2.) During two revolutions of th
shaft this motor will draw in two
of mixture, the same as a four cycle
with two cylinders of the same dim

In equation (a) the factor v, whi
resents the volume of a piston st
the same for the two types of mo
the expansion from volume v_1 to vo
is the same in the two motors, diff
in power must be due to the caus
merated under (2) and (3) above.
two cycle motor cannot operate at
high compression as the four cyc
the quantity of burnt gases remai
the explosion chamber and mixin
the new charge may be less if some
means are provided to clear the cyli
them. The substitution of the valu
in equation (b) will give the exac
of K; γ may be found from equati
and the power of the motor from eq
(a) for any compression ratio r em
In this manner this particular form
cycle motor may be compared with
cycle as to the relative power.

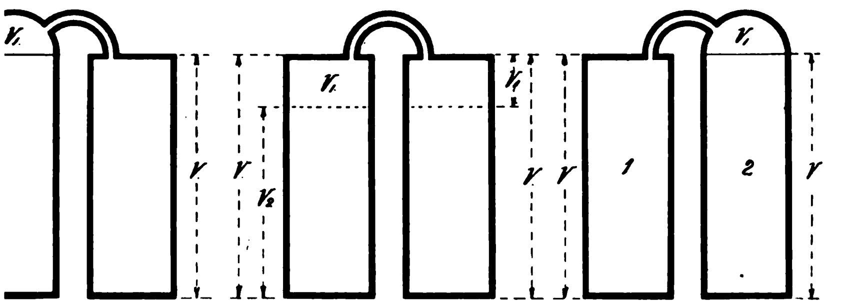
Another type of two cycle eng
shown in Fig. 3. One of the cylinde
practically no clearance. It draws
charge and compresses it to the volu
then this compressed charge is force
the second cylinder, where it is ex
and then expands to the original
v. In such an engine the compressio
be high; the burnt gases are com
expelled, but the displacement of th
ton during the compression str
smaller than in a four cycle engi
four cycle engine draws in a charge
in compressing it forces it back th
a displacement v; this two cycle
also draws in a volume of charge
compresses it only through a displa
v_1. We will apply our formula to
gine of this kind.

e ratio of compression is 6, we $= 6\, v_1$ or $v_1 = v \div 6$; K, when no gases are mixed with the new has its full value, 9.93; γ also has mum value, 1.405. If the constants same as in the four cycle engine we equation (a):

$$\gamma \times (6)^{1.405} \left[\frac{9.93}{.35} \left(1 - \left(\frac{1}{6}\right)^{.35} \right) - \frac{1}{.405} \left(1 - \left(\frac{1}{6}\right)^{.405} \right) \right]$$

gives

$$T = 24.68\ P_o\, v.$$



FIGS. 2, 3 AND 4. THE HORSELESS AGE.

for a four cycle engine with the mensions and the same compresio we found $T = 24.36\ P_o\, v$, we see two systems are practically equal.

BRAYTON CYCLE ENGINES.

Brayton cycle engine one of the inders draws in the charge and ses it, and in the other the charge radually as admitted, and expands. revolutions there are two power and two volumes of charge are n. As the expansion cylinder has rance, the burnt gases are comcleared out. The charge burns at t pressure, while in a four cycle the explosion takes places at conolume. The specific heat at conressure is related to the specific constant volume by the following

$$C_p = C_v \times \gamma = C_v \times 1.35.$$

nsequence of this difference in the heat, K will be only 8.17, instead as may be seen by substituting the f C_p for the value of C_v in the eqtuation for the reaction of gasobustion. (See Kerosene Number.) ermore, in a Brayton cycle engine, he pressure must always be the v_1 is the space in which the charge ressed and v the volume of the iston displacement, $v = 8.17 \times v_1$. npression pressure in the space v_1 the same as if a volume v_1 of the had expanded to a volume $v_1 +$ The compression pressure is therein the ratio of $v_1 + \frac{v}{8.17}$ to v_1 and portion of the charge v_1 has been ring the power stroke. To facilimparison of this motor with the le motor we will assume that the v is equal to $8.17 \times v_1$ so that apthe volume v_1 is expanded to a $2 \times v_1$.

The ratio of compression in v_1 we will assume to be 6. The pressure in v_1, which is the same as in v (the expansion chamber), will therefore fall, during the expansion, from

$$P_o\,(6)^{\gamma} \text{ to } \frac{P_o\,(6)^{\gamma}}{2}$$

A volume v_1 has flown into the power cylinder at the adiabatic pressure $\frac{(6)^{\gamma}\ P_o}{2}$ equal to $3\ v_1$ at atmospheric pressure. If the displacement of the piston in the compression cylinder, v_0, is made equal to $3\ v_1$, the compression in v_1 will be 6.

Owing to the fact that in a Brayton engine, in compressing, a constant pressure must be worked against, there is a slightly greater loss of power by compression than in a four cycle engine, but the difference is negligible.

Now we can compare a Brayton cycle engine with two cylinders having a piston displacement of $3\ v_1$ and $8.17\ v_1$ respectively, an intermediary chamber v_1 and a compression ratio of 6, to a four cycle engine with two unequal cylinders of $3\ v_1$ and $8.17\ v_1$ displacement respectively and the same compression ratio of 6.

In two revolutions the Brayton cycle engine draws in a charge equal to $6\ v_1$ and the four cycle engine $11.17\ v_1$. The maximum energy of explosion for two revolutions in the former will be

$$8.17\ v_1 \times P_o \times .75 \times (6)^{\gamma} \times 2$$

and the energy absorbed by compression

$$\frac{P_o\, v_1}{.405} \left(6^{1.405} - 6 \right) = 15.7\ P_o\, v_1,$$

which leaves for the available energy

$$(150.56 - 15.7)\ P_o\, v_1 = 135\ P_o\, v_1.$$

The four cycle motor gives the following available energy in two revolutions:

$$11.17\ P_o\, v_1 \times \left(\frac{6}{5}\right)^{1.396} \left[\frac{8.466}{.35} \left(1 - \left(\frac{1}{6}\right)^{.35} \right) - \frac{1}{.396} \left(1 - \left(\frac{1}{6}\right)^{.396} \right) \right]$$

$$= 272\ P_o\, v_1$$

The power of a four cycle engine is therefore exactly double that of a Brayton cycle engine of the same dimensions and running at the same speed.

SIX STROKE CYCLE MOTORS.

The volume of charge utilized during two revolutions in a motor of this type is only $.75\ v$, because there is one idle revolution in three, which is employed for completely clearing out the burnt gases from the cylinder. For this form of motor the equation assumes the form

$$T = .75 \times \left(\frac{6}{5}\right)^{1.405} \left[\frac{9.93}{.35} \left(1 - \left(\frac{1}{6}\right)^{.35} \right) - \frac{1}{.405} \left(1 - \left(\frac{1}{6}\right)^{.405} \right) \right]$$

$= 22.21$ for a compression ratio of 6. As for a four cycle engine this value is 24.36, we see that the latter has an advantage of about 10 per cent. over the former as regards power.

A NEW CYCLE PROPOSED.

The author proposes to construct an engine to operate on the following principle (Fig. 4):

Cylinder 1 draws in a charge and on the return stroke compresses it into the compression chamber v_1. Cylinder 2 also draws in a charge and compresses it into the chamber v_1. The two pistons can be connected to the same crank pin. When in the upper dead centre, the charge is exploded and forces the piston in cylinder 2 downward as the expansion takes place. At the same time a new charge is drawn in in cylinder 1, this cylinder being in communication with the compression chamber v_1 by an automatic valve which is now closed. On the return stroke the burnt gases in cylinder 2 are expelled through an exhaust valve, and toward the end of the stroke the charge which is being compressed in cylinder 1 is forced into the compression chamber v_1, clearing this chamber of the exhaust products which would otherwise remain therein. If the displacement of the piston in cylinder 1 is just equal to the volume of chamber v_1 the burnt gases should be completely swept from this chamber. During the next downward stroke the two cylinders draw in a charge equal to the combined displacement of the two piston strokes, through a single intake valve placed on cylinder 1. During the following return stroke the complete charge of mixture is compressed in the compression chamber v_1, being entirely unmixed with burnt gases. The cycle then begins anew.

Let v_1 be the volume of the compression chamber, and v the volume of the piston stroke displacement in cylinder 2. During two revolutions the charge drawn in and compressed amounts to $2\ v_1 + v$. If the machine worked on the four cycle the charge drawn in would be only $v + v_1$.

The compression may be as high as in a four cycle motor. The expansion will be from a volume v_1 to $v + v_1$, instead of from v_1 to $v + 2v_1$, as would be the case in a four cycle motor. The expansion is therefore smaller in this case. Assuming a compression ratio of 6, the formula becomes:

$$T = \left(\frac{6}{4}\right)^{1.405} \left[\frac{9.93}{.35} \left(1 - \left(\frac{1}{5}\right)^{.35} \right) - \frac{1}{.405} \left(1 - \left(\frac{1}{6}\right)^{.405} \right) \right] = 34.$$

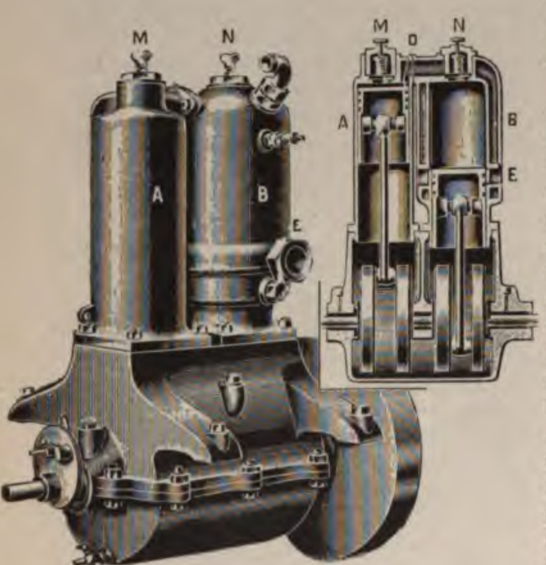
The same engine worked on the four cycle plan would give $T = 1.25 + 24.36 = 30.45$, so that an increase of power in the

ratio 34 ÷ 30.45 is obtained with the cycle described.

SPECIAL ENGINES.

Figs. 5 and 6 show an elevation and a section of the Lepape, a well known French motor of the two cycle type. The operation of this engine is as follows:

Toward the end of the expansion stroke in the large cylinder B, and while the exhaust takes place through the port E, the pump cylinder A forces a fresh charge of mixture into the cylinder B. This charge is compressed by the return stroke of the piston in B. The charge is then ignited and expands, and at the end of the expansion stroke the pump piston forces another charge into cylinder B. The fresh charge comes therefore in direct contact with the burning gases as they pass out of the cylinder, and it might be expected that this would result in pre-ignition, but it is found that no pre-ignition occurs. In engines in which this phenomenon occurs it is rather a result of the new charge coming in contact with highly heated metal parts. The Lepape motor has no exhaust valve; only the two automatic valves, M and N. The compression may be as high as in a four cycle



FIGS. 5 AND 6.—THE LEPAPE ENGINE.

motor and the cycle is equal to the four cycle with respect to the above mathematical comparison regarding power at a given speed.

THE END.

Decline in English Coaching.

There can be no doubt that the motor car is largely responsible for the rapid decline in the interest in coaching as represented by the road coaches that run out of town. For the first time on record, we believe, only two coaches are on the road this winter, and the fact is undoubtedly traceable to the enormous increase in motoring as a means of spending days in the country.—*London Court Journal.*

LESSONS OF THE ∴ ROAD ∴

The Early Experience of One Steam Carriage Owner.

By H. W. S.

Having had THE HORSELESS AGE from its start and being interested in all things pertaining to the business, even to the accidents reported, I am pleased to give my experience and ideas, hoping to interest and perhaps benefit some readers.

I have read with a great deal of interest and followed closely the experience of other readers, and they have all been interesting, and from many I have learned something.

My experience as an owner and an operator began while in New York city, in June, 1900, by the purchase of an old style steam carriage of the narrow tread pattern.

After a day's work on it at the stable where the owner kept it, and a slight trial, which proved satisfactory to me, I paid and took possession of it. As I was unable to ship it by steamer until the next day, I thought I might as well have a little fun out of it and started about noon to get my experience.

I was given a few minutes' instruction and turned loose. I had some little difficulty in steering it but soon got the knack. It ran like a bird, and by the middle of the afternoon I found myself above Tarrytown on the Hudson and improved the opportunity to call at the automobile works located there, where I received the best of treatment. One of the manufacturers took my machine for a spin about the grounds and on his return called my attention to numerous small adjustments that needed attention and that would undoubtedly have caused me trouble later on had they been neglected. I was given a ride in one of their new carriages, shown the works, my gasoline tank was filled, and I was given the best of attention and care, and left them well satisfied with my stop, and my auto fever increased several degrees.

I found the machine ran much nicer for the little attention it had received, and so full of enthusiasm was I that, instead of turning back to New York, I asked directions as to the nearest place east of there, and started for

HOME OVER THE ROAD,

knowing that I could ship it from one point as well as another.

After a most delightful afternoon outing I made for Stamford, Conn., just as it was getting too dark to see my water glass. I had had no difficulty of any kind, and as far as I could judge there was nothing to be done other than to replenish the tanks and continue.

The next day was rainy, but I had not begun to have enough, so, purchasing a rubber coat, I put her through a pouring rain and mud to Springfield, Mass. The muddy road and my inexperience, however, were too much for the machine, and as I was about entering Springfield, my front sprocket became loose. I had noticed for some time before considerable noise under the machine and that my steaming capacity was growing weak, so under the circumstances I thought it best to ship it from there.

On getting the machine home I riveted on the sprocket and found that my lack of steam was owing to the strainers in the gasoline tubes being plugged. I removed these and cleaned them and had no further trouble from this source for about 1,000 miles, when they became clogged again. This time I removed them entirely. I did not put them back and I don't think the present owner of the machine ever has.

The only difference I noticed was that when the steam was low the fire did not work quite as well, but this was not to be considered with the fire dropping on you when miles from home.

I had operated but a few days when I noticed that the exhaust seemed irregular, and the following Sunday decided, before taking a long ride that I had planned, I would take a look at the valves. In order to remove the steam chest cover I had to disconnect the upright connection between the links and the reverse lever. This was the cause of my first serious trouble.

I got at the valves and found what I had expected—that one of the valves was so far out as to travel clear by one port and not open the other at all, thereby shutting the steam off from the one end of the cylinder and opening at the other end in advance, so that it operated directly against the other cylinder. This performance took place in my backyard before a crowd of my friends that helped me along by asking questions.

I put back the steam chest cover, but, alas! I did not put back the link connection to the reverse lever.

A CIRCUS IN THE BACKYARD.

After getting steam to the limit, 180 pounds, I proceeded to screw up the packing while it was hot. The car was on a slight incline and by pressing hard on the screwdriver started it going backward. I was on the side next to the reverse lever, and noticing it was in the correct position to go ahead, without thinking I grabbed the throttle to give her a little steam to put her back. I did not know that the disconnected links were in the backing position, but was suddenly made aware of the fact by the car making a sudden jump backward, and as I had hold of the worst part about the machine to hold on by, the job was done and over with before I had time to realize where I was at.

There was a roar of the exhaust steam, and it was over within a minute. The first obstruction was my stable door, which was swinging open. This came off the hinges and was run over. The next thing in line was a clothes reel in the centre of

My right hand steering wheel .o this and down it came, paral- wheel on that side at the same e reel lasted just long enough t into my backyard fence, where after breaking off a stringer 2x4 d demolishing one of the rear he crowd suddenly had business and as the last one left I heard /ho was with him, say, "Come 'e had better get out of here be- 'e kicked out." I did not cuss ie, as it had simply done as I but spent the rest of the day nyself and straightening out

BROKEN CRANK PIN.

got things to rights I found it than ever and was enjoying my when, on stopping on a sandy /e a horseman all the road, I ›pening the throttle that I was in ain. Something had given way, estigation I found my right hand had broken short off next to the l the pin, connecting rod, slide rod lay in the dirt under the he piston having stripped from the blow and letting the whole . It was getting dark, and as I miles from home the prospect ıcouraging. After thinking the ›ver for a few minutes I made nd to see what one side of the uld do. I did not stop to dis- e link properly, but removed the nd washer and disconnected the : disabled engine by bending the th a wrench. This, being a drop raightened out easily afterward 'eaking. I then cut two short vood and wedged the link block tre of the link and tied them in ng, so they could not drop out, my parts and got in, my com- 'e a push to start her and then ı and we ran home with one hout any trouble and no stops. ink we were hung up over fif- tes. This ended my busy day, his machine was concerned, and bout all the serious trouble I rith it.

SATISFACTORY SERVICE.

saw a hill or a bad road that this ine would not negotiate when in ıning shape, and it was a most r running one to me; and its 'ner is as well pleased with it as s. I ran it about 3,000 miles wned it. I always cared for it ing all my own repairs. Com- ı a horse it would do what a l not do as to time and distance, t cost me 25 cents where the keep would have cost 100, or took of the time caring for it that a d have had, and I used it many ccount of its convenience where ve used a horse once.

wned and operated many auto- ce, but I will say that, all things considered, this little machine compared favorably with any of them. It rode easily and ran quietly, was strong and would go as fast as the law allowed or it was safe to travel on our roads. I ran another just such machine on a trip of 130 miles through the mountains of New Hampshire, making the distance in ten and one-half hours and using exactly 10 gallons of gasoline, and I have a friend that run his 117 miles on 9½ gallons. There are about fifty automobiles in this city and many of them are these old style cars. They have most of them been bought second hand and fixed up by their owners, who care for them themselves, and are owned by men that would not think of owning a horse on account of the expense.

A Seized Transmission.

BY C. WILL TRAVIS.

The machine was a new one, a gasoline runabout made in ———, and, as it was the owner's first road experience alone, something was sure to go wrong; it always does on such occasions.

Mr. G——— had taken a friend on an 18 mile spin over a circuit of roads which, though a little hilly, were good going. Upon returning to the city he found there was yet time to repeat the trip before the supper hour, so he invited the Major to join him for an hour in his new found enjoyment.

All went well on the second trip until a point half way of the circuit was reached, where a stop was decided upon. There lay the trouble, though they did not realize it until their return to the machine, when they found that any effort to start the engine would cause the vehicle to move forward, no matter in what position the speed control lever was placed. Everything else was then tried in like manner, but to no purpose. The engine and wheels refused to move independently of each other.

The machine was then pushed, not without some effort, into a barn, and G——— and his friend the Major were brought to town by the old reliable method, a farm horse and wagon without springs, a thing they could hardly sanction as the most enjoyable to ride in, though it got them there in time for supper, and much to the enjoyment of their respective households.

Being interested in automobile mechanics, but not one might call an expert, I received a call during the evening from my friend in distress, with a request that I go out with him the following morning and diagnose the case. After retiring that night several hours were spent thinking before I found myself ready to sleep; but sleep soon followed a decision upon a plan of action.

The next morning we gathered up a few tools and drove out to where the machine was. We proceeded to make the needed diagnosis, and found, by first stripping the transmission of its clutches and low speed gears, that the transmission sleeve had seized on the engine shaft. I hoped to be able to loosen it, but not a particle of end play could I get. I reassembled the parts I had removed, and after opening the cylinder relief cock the machine was pushed out into the road to the top of a slight grade and there the rear axle jacked up, with the wheels just clear of the ground, and the engine started. After giving the roadhouse keeper and some of our onlooking assistants the necessary instructions for giving us a start by pushing us off the blocking that supported the rear axle, and to continue their efforts for a few yards after we were clear of the blocking, we climbed in, gave the signal to go, and were started homeward with the cry "They're off!" accompanying the push.

We arrived home safely but for the scares of a few close shaves, owing to the small limits of our speed range. Arriving home, I stripped the machine, took off the engine, removed the crank shaft, upon which the trouble was located, and went through the usual course of treatment, with coal oil, wet clay, heat and the hammer; and after several hours' hard work I was rewarded by the removal of the sleeve, and found a good size groove worn in both shaft and sleeve, with the usual scale on the shaft, and all in line with an internal oil hole.

The trouble evidently had been started by a grain of sand or milling shaving remaining in the internal gear housing, which found its way through the oil hole in the sleeve to the shaft, and there, to use a slang phrase, "started a rough house."

By noon the next day the machine was in shape again, and after giving it a test of a few miles I felt it was safe for G——— and the Major to resume the interrupted ride of two days previous, which they proceeded to do without incident, to their evident satisfaction, and a remark from G——— to the effect that "I'll know what to do the next time that happens." And I stood wondering "But what if it is something else?"

A Trip to the Grand Rapids Barbecue.

BY A. G. HUIZINGA, M. D.

Everybody knows that almost any kind of a self propelled vehicle will run, and even make time, on a boulevard or good road; but it takes more than an ordinary "horseless carriage" to negotiate the bad, sticky and stiff clay roads found in so many parts of our country.

I have been East, West, North and South, and never saw such bad roads as we have right here in Chicago. It always makes me smile when I see some Eastern automobilist describing a bad road, and I often wish I could put him on Wentworth avenue, from 103d street down, or on 115th street west of Michigan avenue, during the muddy season, which lasts usually about five months a year. During this season merchants deliver their merchandise by wheelbarrow over the sidewalk, and one often finds derelict wagons abandoned till

the dry season opens, so they can be hauled out.

These streets, however, did not prevent me from getting the "fever," and when I did get it I knew of no ordinary methods to combat it; so I resorted to Christian Science and tried to make myself believe I did not want an automobile. The results of the treatment were spasmodic, for every time THE HORSELESS AGE would come to my table my heart would come up in my throat, and the only thing that would prevent my choking would be a long stare at the streets. Then the automobile shows, the automobile show windows and the swift gliding carriages on the boulevards all contributed to my discomfort. I finally gave out and succumbed to the inevitable—but what was the kind to get? I could get no current here, so electrics were out of the question; I wanted to use it winter and summer, and, being an ex-steam engineer, frozen pipes, etc., were not to my liking. So gasoline it should be, but what type—single cylinder, double opposed, waterless, front or rear motor? I gave it up, bought blindly—it happened to be a 4 horse power light runabout. I have not been disappointed.

I have never had the pleasure of riding in a heavy car, but it seems to me that on bad roads the light or medium weight runabout has a decided advantage; it does not sink so deep into the mud or sand, and not only does not need such a powerful motor, but the proportion of power to weight can be less; for does it not seem reasonable that a 4 horse power, 800 pound carriage, sinking into the mud 3 inches, ought to make better time than an 8 horse power, 1,600 pound carriage, sinking into the mud 4 inches? This is a theory, but practical results seem to support it.

Last August the Automobile Club of Grand Rapids, Mich., invited the Chicago Club over for some sort of a barbecue, and a half dozen or more big, gaudy "devil" wagons crossed over the lake on a steamer, and then made a 25 mile run from Holland to Grand Rapids. That seemed ridiculous to me, and I wondered what automobiles were made for, whether for the comfort, convenience and pleasure of mankind or for the benefit of the transportation companies. So I invited, or rather dared, a friend, Mr. Boersma, to make the trip in my runabout, taking the precaution to first read one of Robin Damon's articles to him, after which he said: "Doc, I'll go you and you can't shake me; I'll stand by you through thick and thin." And so he did. The very thought of him fills me with gratitude, for he acted as log keeper, treasurer (or rather disburser), water carrier, and, last but not least, he was a veritable "beast of burden" when it came to those fearful Michigan sand hills. After we emerged from Chicago's sloppy streets we had a most enjoyable ride of 106 miles, mostly over crushed stone roads, to South Bend, Ind., where we arrived in the evening, and found two big "devil" wagons, which had made the same trip in practically the same time as we. We complimented ourselves on our good record. The following day we started north for Michigan, and we soon found all the sand we had bargained for. Everything went well, however, until we came to a crossroads village named Bloomingdale, since nicknamed "bloomin'" dale. It was just beginning to get dark, and there being no hotel accommodations, we decided to push on 6 miles to Grand Junction; and so we did, especially as regards the pushing. Here we had our first real taste of the red and white flowing sands of the Michigan sand dunes, that blow about like snow banks in winter and often travel from place to place. It took us an hour and twenty minutes to make the 6 miles. We had no lamps and it was as dark as it always is when one is a stranger in a strange land; by mere luck we found the place and registered at the hotel, footsore and weary, hungry enough to eat raw turnips. Here we were 40 miles from Holland, our destination.

The next morning we started in good spirits, expecting to dine at the old homestead. We had one of those crazy bicycle maps in our pocket, which we soon laid upon the shelf, as it was absolutely unreliable and worthless. We inquired our way of the farmers, whose directions were so divergent and for which we paid so dearly that Mr. B. told one lot of grangers "You Michiganders are the most stupendous lot of liars I ever met." To my surprise no one denied the allegation.

A large part of these 40 miles lies through sand dunes, some of which are over 200 feet high. There are no improved roads, and the natives pay no attention to the points of the compass; they circle around hills, cut across meadows and avoid creeks in a most kaleidoscopic fashion. The sun was not shining and we often knew not what direction we were running. We worked two hours to get up one of those hills where we had been directed to go by one who knew. Mr. B. would push and carry a rock to place behind the rear wheel when we stopped, and I would push on the dash, race the motor, throw in the clutch and it would move about 2 feet when the motor would stop; a rest, a repetition of the same performance, and we finally mounted the hill and landed in a corn field where a man was cultivating the corn. Hailing him, he turned around, gave us a bewildered look and said: "How the d—— did you get up here?" and "What are you doing here?" We told him that was just what we wanted to know.

I don't know what the grade of the hill is, but it is about the height of the Masonic Temple in Chicago, which means 200 feet or more, and the length of the incline about the distance of one full Chicago block, about one-eighth of a mile. Imagine, if you can, the violent state of our feelings, the storms of emotion, etc., when upon inquiring our way we were told to go down the same way we came, turn to the left, take the left fork of the ro[ad] so on.

Down the hill we went, not coasti[ng] no, not even on the high gear; th[e] was so deep and loose we had to [use] low gear part of the time. We reached Holland, nearly consumi[ng] whole day to travel 40 miles. On t[he] from Holland to Grand Rapids one big "devil" wagons got mired so it [had to] be hauled out by hay motors. We the same road and never left our se[ats] successfully passed over where th[e] touring car floundered through. W[e] eled about 500 miles; our mishaps [consist]ed of one puncture and one break chain.

New Coating for Metals

In a recent United States patent [g]to John V. Brauch and Bennard H[...] a new coating for application to ir[on] steel, to protect them against the [...] of the elements, is described.

The coating comprises a com[...] composed of a mixture of crude [turpen]tine, linseed oil and fish oil. Th[e in]gredients are used in the followin[g per]centages: Crude turpentine, 20 per [cent.;] linseed oil, 40 per cent.; fish oil, [...] cent. The metals are first treate[d in a] bath of sulphuric acid for the pur[pose of] removing any scale or foreign mat[ter and] to smoothen the surface. After the m[etal has] been thus treated it is thoroughly [washed] to remove the cleansing agen[t...] metal is then immersed in the [...] composition, which is maintained [during] the immersion at a high temp[erature,] preferably boiling point, and then r[emoved] to be dried. The metal is then pl[aced in] a suitable oven and permitted to [remain] there until dry.

The crude turpentine is claimed [to sup]ply an adhesive quality in the coati[ng and] causes it to adhere firmly to the m[etal, so] that when dried it cannot peel or [scale] off. The linseed oil furnishes the r[equisite] dissolving property for the crude [turpen]tine in order to obtain complete [...] that will cause thorough intermix[ture of] the ingredients of the compositio[n, and] the fish oil affords resistance to the [action] of heat in the process of drying th[e coat]ing on the metal by furnishing el[asticity] to the coating and preventing crack[ing or] breaking of the coating on the meta[l] during the drying operation and [subse]quent thereto in the use of the metal.

The first of a number of new mot[or om]nibuses for the London Motor O[mnibus] Syndicate has just been completed [by Stir]ling's Motor Works (Limited), G[ranton,] near Edinburgh. These omnibuses [are] the first large public service motor [to] run in the metropolis. The Stirli[ng] weighs 32 hundredweights empty, [and the] engine is of 12 horse power; 14 m[iles an] hour is the speed.

VEHICLES AND PARTS.

...all Gasoline Touring Car.

...nneau touring car illustrated in the design of Frederick A. Ball, ...ew York Gear Works, 57 Milton ...ooklyn, N. Y. The vehicle has a ...se of 80 inches and a standard 56 inches. It has 28 inch wheels, ... 3½ inch Goodrich clincher tires. ...eel bearings have plain bronze ... The axles are of solid steel, both ... rear axle being 1½ inches square. ...e is built of 1½ inch angle steel, ...d for a length of about 3½ feet ...axles with angle steel pieces. It ...ted on four semi-elliptic springs, ... by 1½ inches, with six leaves.

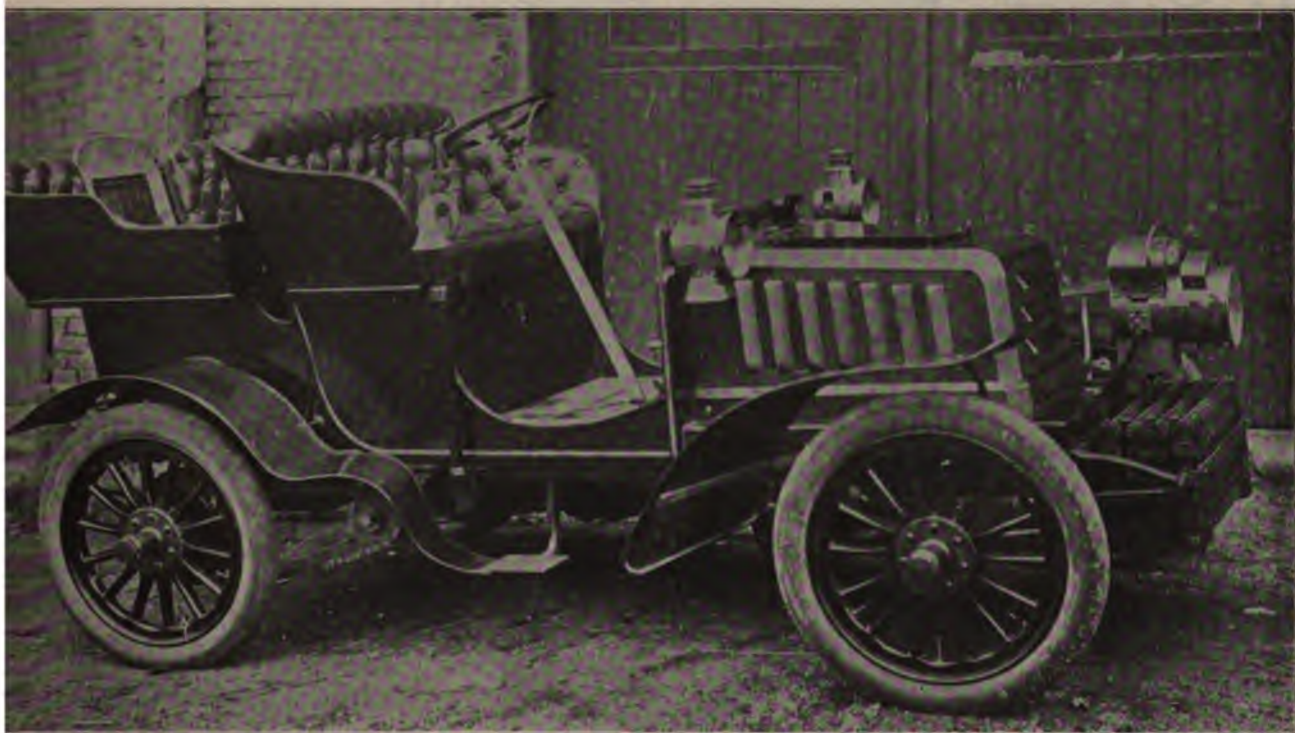


Fig. 1.—Gasoline Tonneau of Frederick A. Ball.

...gine is a double cylinder vertical ... inches bore and 6 inches stroke. ...at a normal speed of 800 revolu... minute and a maximum of 1,000 ...ns per minute. The two cylinders ... in one piece, but the cylinder ...e separate therefrom. The crank ...ble throw, with crank pins set at ...ees. Contrary to common prac... engines of this kind, there is a ...ring on the crank shaft between ... cranks. The crank case is made ...ular end plates, by which the en... supported. These plates are cast ...s, which are drilled to receive the ...e' supporting tubes of 1¼ inches ... In addition two trusses pass be...rank case from side to side of the ... The flywheel of the engine is 20 ... diameter, has a 6 inch face and ...34 pounds, the weight of the mo... flywheel being 375 pounds.

...nition is electric and of the jump spark type, the two spark plugs being located centrally in the head of the cylinders. The current is furnished by a dry battery, and a single coil operates both plugs. The ignition system is illustrated in Fig. 2. On the left of the drawing is seen the combined circuit breaker and commutator, which is located on the half speed shaft of the engine. A is a plate of insulating material, which can be rocked around the half speed shaft to advance or retard the ignition. To this plate is fastened the post B, which supports the circuit breaker blade C. The spring force of this blade is not depended upon, as in most engines, but a special coiled spring D is provided, which draws the blade C against the circuit breaker cam. This cam is made with two depressions on its circumference. When the nose on the blade C rests in either of these depressions the contact point F on the blade is in contact with the point of the contact screw G. As the cam rotates, the nose of the blade C is raised as soon as it reaches the end of the depression, at which moment contact between the blade and the contact screw G is broken and a spark produced at one of the spark plugs. It will be noticed that the two depressions on the cam are spaced at an angular distance of 90 degrees from each other, which corresponds to the time intervening between explosions in the two cylinders.

The commutator wheel serves the purpose of distributing the spark to the two cylinders. It is fastened to the half speed shaft, alongside of the circuit breaker cam. The wheel is made of insulating material, with a narrow contact strip I at one part of its circumference. Upon the circumference of the wheel bear two sheet metal brushes, K and L. This contact strip is grounded to the half speed shaft by means of the screw which holds it in position. The half speed shaft is shown in the position in which a spark passes at the plug shown on the right. The secondary current passes from the left hand terminal of the coil to the brush L, through the contact strip I into the frame of the engine, and then returns through the spark plug shown on the right to the other terminal of the coil. After the cam shaft has turned through three-quarters of a revolution, the contact strip I will be under the brush K and a spark will pass at the spark plug shown at the left, the nose on the blade D at that moment passing out of the other depression of the cam.

A double cam is provided for the exhaust gear; the cam gear is shifted sideways in starting, which automatically relieves the compression.

The starting crank for the engine is located on the dashboard, being geared to the crank shaft by means of a chain and sprockets, and starting is effected from the seat. The cooling water is carried in a 5 gallon tank secured to the dash under the bonnet, and is circulated by a chain driven rotary pump of special design. A radiating coil, composed of twenty-four tubes with fluted copper flanges 1¾ inches in diameter, is carried in front of the vehicle. The tubes are five-eighths of an inch in diameter and the coil was made by the New York Tube Bending Company. The tubes are arranged six rows high and four rows deep, and are 28 inches in length. The gasoline tank holds 8 gallons and is located under the seat.

The change speed gear is of the sun and planet type, and gives two forward speeds and one reverse. It is illustrated in Fig. 3.

Referring to this figure, the shaft passing through the gear is an extension of the engine crankshaft. The friction clutch is located on the side toward the engine. The clutch is of the expanding type, operated by a conical shifting collar. The view on the left of Fig. 3 refers particularly to the clutch. The expanding flange and the web are cast in one piece. The flange is split, and is separated from the web by a saw cut extending nearly all around the circumference. At the side opposite the slot in the flange the web is strengthened by a rib, as shown. The two ends of the slotted flange are drawn together by a curved spring of sheet metal S, in addition to its own spring. The two ends of the flange can be forced apart by the rotation around its axis of a cam C, and the flange then grips in the outer drum, which locks the change speed gear and causes the power to be transmitted directly.

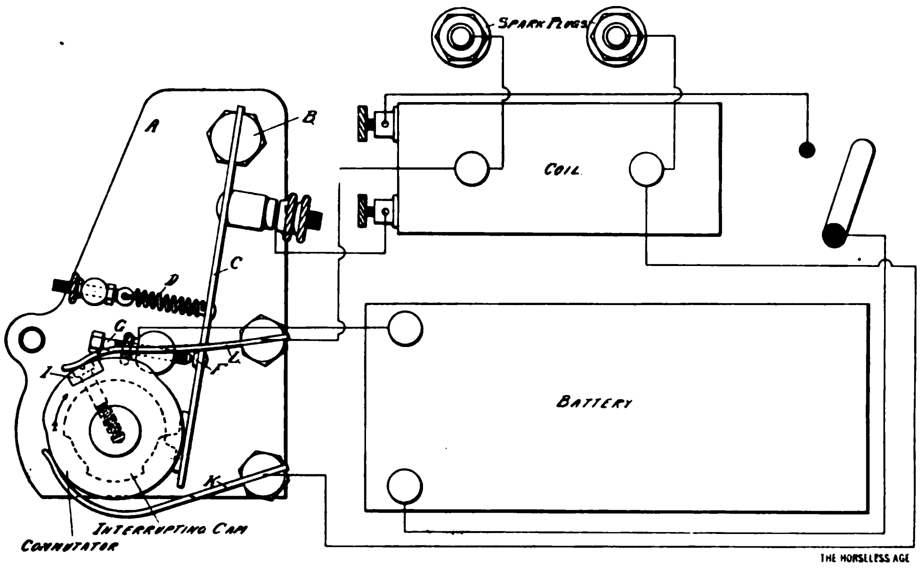


Fig. 2.—The Ignition System.

No internal gears are used in this planetary transmission. One pinion is formed integral with the shaft. The studs of the planetary pinions are made of tool steel and the pinions are bronze brushed. The planetary pinions are of peculiar construction, two of the pinions being made in a single piece, the opposite ends of which are made with the same number of teeth of different pitch, the teeth being milled in from both sides. A third pinion, of larger diameter, is forced over this double pinion and occupies a central position thereon. The gear will be seen to have two enclosing crowns, to which brake bands may be applied to hold them from rotation. By applying the band to a crown on the left the reverse motion is obtained, and by applying the other brake band the slow forward speed.

This gear is also made for the market by the New York Gear Works, in several sizes, one suitable for from 3 to 5 horse power engines, another for 5 to 12 horse power engines and a third for 12 to 24 horse power engines, the pitch of the pinions being 10, 8 and 7 respectively.

Fig. 4 shows the brake band by means of which the crowns of the change gear are held from rotating when low speed or reverse motion are desired. This brake band consists of a càst iron ring with a central reinforcing rib running all around the outside and two lugs near the split in the ring. These lugs are drilled to receive an operating rod. One of the lugs is made with a cam surface on its outer face. An operating rod passing through the drill holes in the lugs has pinned to it on one end a collar with a cam surface corresponding to that on the lug. The other end of the rod is threaded and receives a nut and a lock nut. A spring is passed over the rod between the two lugs and forces the ends of the ring apart. When the rod is rotated the cam surfaces co-act and the ends of the ring are forced together, and the ring clamps or grips the crown of the change gear.

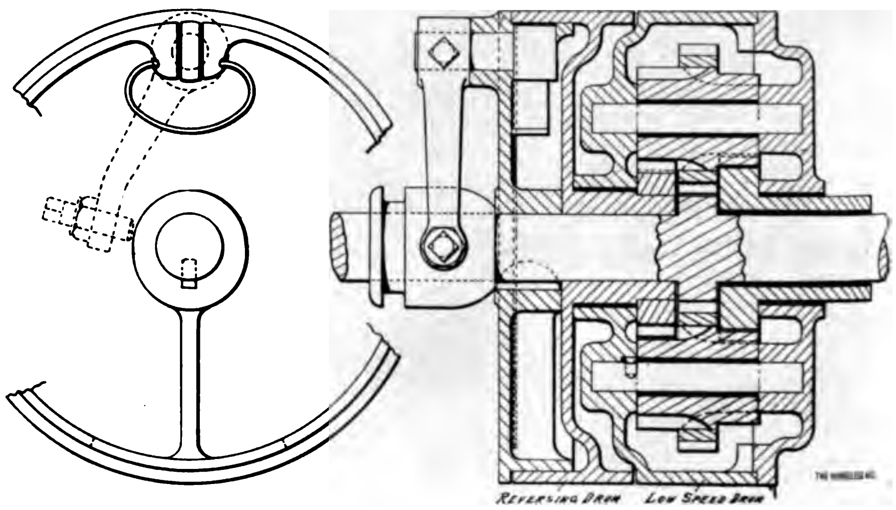


Fig. 3.—Section of Change Speed Gear.

The power is transmitted from the change gear to a transverse countershaft by means of a pair of bevel gears. Upon this countershaft is located the differential gear. The entire gearing is enclosed and runs in oil. The two gear cases are supported upon a special frame, which is supported pivotally in front. The countershaft is made in sections, with jaw clutches to prevent any binding in the bearings in case the latter should get out of line. From the countershaft the power is transmitted to the rear wheels by means of separate Baldwin chains of $1\frac{1}{4}$ inches pitch, one-half inch wide. The sprockets have fourteen and thirty teeth respectively.

Fig. 5 is a section through the rear wheel hub, showing the driving sprocket and hub brake. The latter is of the expanding ring type and constructed on the same principle as the friction clutch of the change gear, already described. This brake is practically dustproof, which is also the case with the clutch.

The vehicle has wheel steering, the hand wheel being 13 inches in diameter, and acting through a worm and wheel sector irreversible mechanism. One complete turn of the hand wheel moves the steering wheels from limit to limit of their motion.

A separate lever controls the high speed, another the low speed and reverse. The hub brakes are operated by a pedal. A thumb lever is provided for operating the

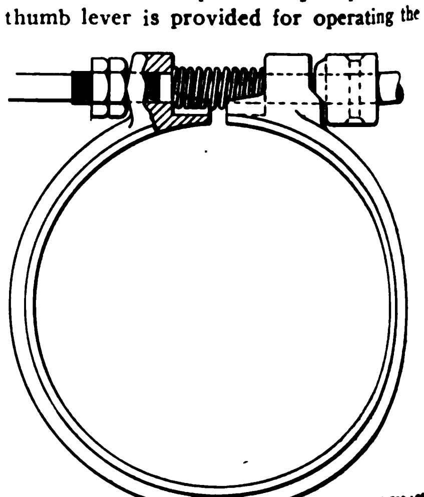


Fig. 4.—Change Gear Brake.

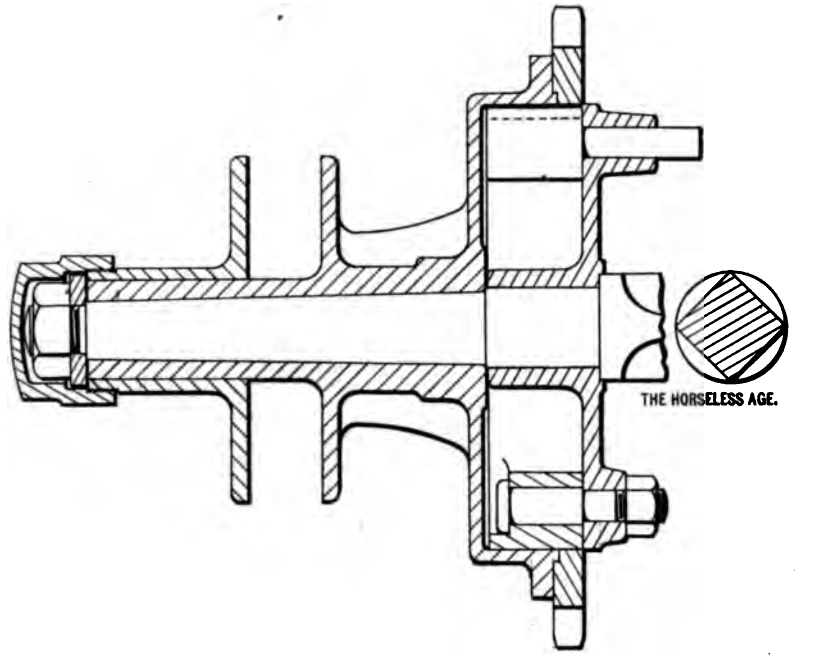


Fig. 5.—Rear Wheel Hub.

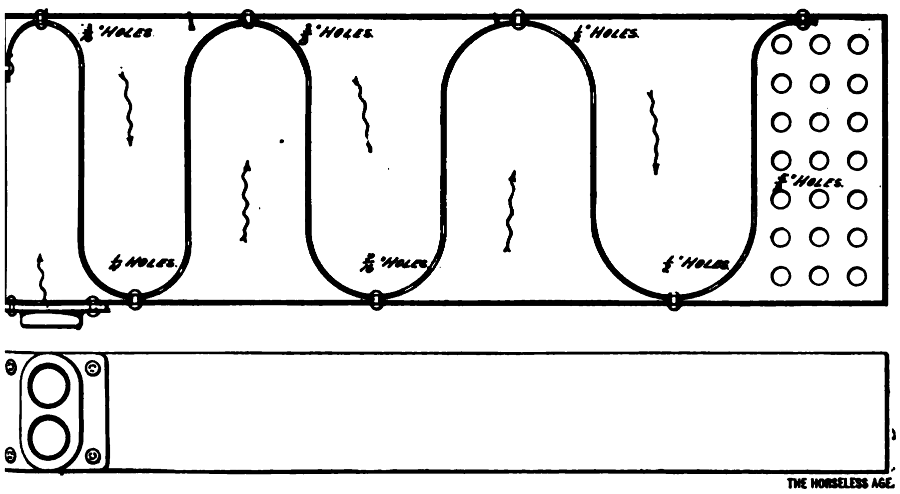


Fig. 6.—Muffler.

rottle of the engine and another to time e spark.

The muffler is built of black Russia iron d is rectangular in shape, as seen in Fig. · Inside this rectangular box is dis-sed a long strip of sheet iron bent into wavy form, as seen in the figure, which vides the box into eight compartments gradually increasing size. These com-rtments are in communication with each her by drill holes in the partitions, which so gradually increase in size from one d to the other. The exhaust from the gine enters the smallest compartment, sses from one to the other and leaves rough a large number of drill holes in e wall of the largest compartment at the pposite end.

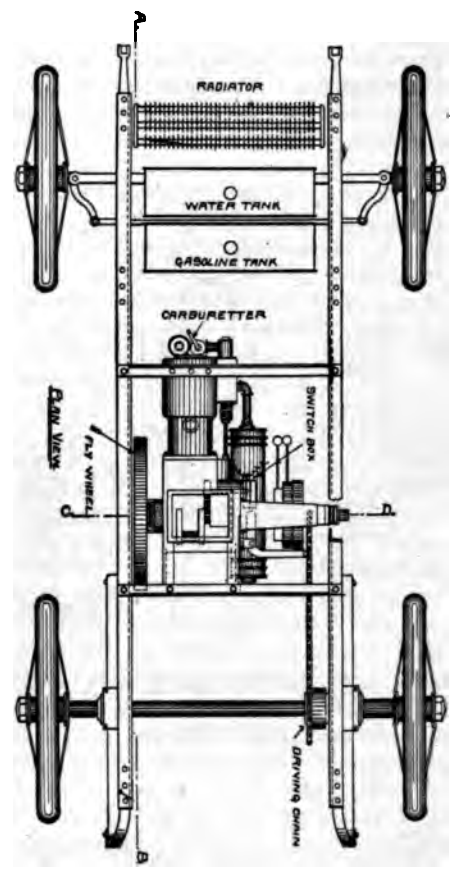
The weight of the vehicle complete is ,000 pounds.

A number of local automobilists are ontemplating the erection of a three story utomobile charging, storage and repair tation on Main street, Niagara Falls.

Dyke's New Gasoline Carriage Design.

A. L. Dyke has redesigned his No. 1 outfit, as shown in the accompanying cuts, the improvements being as follows:

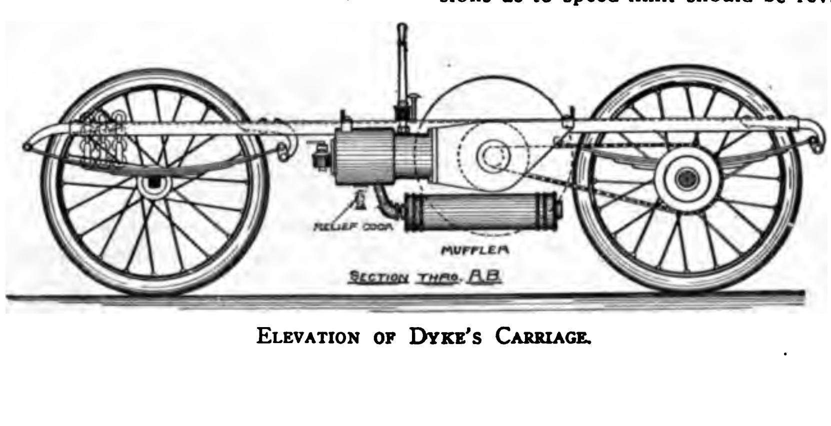
The engine is horizontal as before, but the supporting bracket on the crank case has been changed, so that the engine now hangs much lower, giving a lower centre of gravity. The two sprocket wheels are also more nearly on the same level, thus minimizing the effect of spring action upon the transmission and vice versa. The transmission gear, of the sun and planet type, is placed on an extension of the engine shaft, and for high speed the transmission is direct without gears running. The transmission is protected by a cast and sheet iron case extending from the side of the crank case. The outer bearing on the gear case and the engine bearing at



Plan of Dyke's Carriage.

the opposite end of the crank shaft are of the ring self oiling type, as shown. The gear case also serves as support for the operating levers.

At a meeting of the Middlesex (England) County Council on November 27, the following resolution was passed: "That representation be made to the Local Government Board requesting them to require that a registered number be so affixed on the back of every motor car as to insure its identification; that the present provisions as to speed limit should be revised."



Elevation of Dyke's Carriage.

BEGINNERS PAGE.

Compound Engines—Pumps.

CYLINDER CONDENSATION.

At the moment the valve opens the steam port, the cylinder walls are at a comparatively low temperature, for the exhaust steam has just left the cylinder. When the live steam enters the cylinder and comes in contact with the comparatively cool walls, it rapidly gives up some of its heat to the

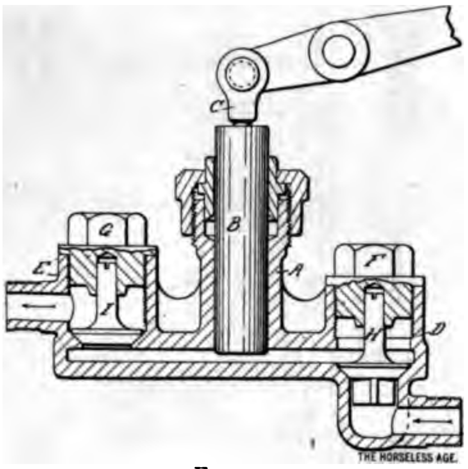


FIG. 1.

latter, and unless it is highly superheated a considerable portion of it is condensed, and thus prevented from doing any useful work of expansion. This phenomenon is called cylinder condensation. It is one of the chief causes of loss or of inefficiency in small engines working with saturated steam. To reduce cylinder condensation and the loss therefrom compound engines are sometimes used on automobiles.

THE COMPOUND ENGINE.

A compound engine is an engine in which the steam is expanded in two stages. Such engines, as applied to automobiles, usually have two cylinders of equal piston stroke, but one having about one and one-half times the diameter of the other. The small cylinder is called the high pressure cylinder and the large one the low pressure cylinder. The two cylinders are arranged parallel with each other and the pistons connected to cranks at 90 degrees, the same as in a simple, double acting engine.

The mode of operation is as follows:

Live steam is admitted to the high pressure cylinder and expands therein to about one-half its original pressure, say from 200 pounds to 100 pounds per square inch. It is then exhausted into a receiver or a chamber intermediate between the high pressure and low pressure cylinders. This receiver sometimes takes the form of a coil of tubes located over the boiler, and combines then the function of a reheater, in which additional heat is imparted to the steam. From the receiver the steam is admitted into the low pressure cylinder, and after expanding therein it is exhausted to the atmosphere. The greater economy of the compound engine is due to several causes: As the temperature fluctuations in the cylinders are much smaller there is less cause for cylinder condensation; greater ratios of expansion may be obtained.

An ordinary two cylinder compound engine is not self starting from any position, as is easily proven. In starting there is, of course, no steam in the receiver, and the first impulse must come from the high pressure cylinder. Now if the piston of this cylinder should be at the end of the stroke or the crank in the dead centre position, no turning effect would be produced on the crank, and the engine would not start.

To remedy this defect, compound automobile engines are always provided with a "transforming valve," which permits of admitting live steam to the low pressure cylinder in starting, thus transforming the engine from compound to simple. This transforming valve is essentially a double three-way valve. For compound working it connects the exhaust port of the high pressure cylinder with the receiver and the receiver with the admission port of the low pressure cylinder; for simple working it connects the exhaust port of the high pressure cylinder with the atmosphere and the admission port of the low pressure cylinder with the live steam chamber.

Another advantage of the transforming valve is that it permits of practically doubling the power of the engine. In a compound engine the effective pressure in each cylinder is only about one-half the boiler pressure, whereas it is the whole boiler pressure in a simple engine. If in exceptionally difficult places or on steep hills more power is required than the compound engine will develop the transforming valve can be set in the opposite position and the power of the engine doubled. Compound engines are little used on steam carriages.

PUMPS.

Both water pumps and air pumps are used on steam carriages, the former for feeding water to the boiler and the latter for maintaining an air pressure on the liquid fuel. Both are made in three different forms, viz., crosshead pumps, independent steam pumps and hand pumps. The crosshead pump can, of course, only be operated as long as the engine runs, i. e., while the vehicle is in motion. The independent steam pump can be operated whenever there is steam in the boiler, and the hand pump is always ready for use. All pumps for either water or air are of the "plunger" or "piston" variety, as distinguished from rotary pumps, used for circulating the cooling water in gasoline engines, which have to work against a pressure of only a few pounds per square inch. Hand pumps and crosshead pumps are identical in construction, except as to dimensions, the volume of stroke being larger in a hand pump.

The plunger of the pump may b
nected to the crosshead of the engi
rectly or it may be operated therefroi
double armed lever, as shown in
The end of the lever arm, shown
off, is provided with a slot, through
passes a pin, forming an extension
crosshead pin.

Referring to Fig. 1, A is the pun
inder in which is located the plun
The latter is tubular, and has con
to it by a ball joint the plunger
The plunger passes through a stuffi
of usual construction. The cylin
shown cast in one piece with the
valve chamber D and the discharge
chamber E. These valve chambe
closed on top by plugs F and G
tively, which serve at once as guid
the conical poppet valves, the suction
H and the discharge valve I. The
of the pump is as follows:

When the plunger B rises in the c
the suction produced thereby lifts the
H and draws water into the cylin
indicated by the arrow. When the
reaches the limit of its upward strok
tion in the cylinder ceases, and the
H drops back on its seat. Whe
plunger begins its downward motic
valve I is forced from its seat ar
water is forced out of the discharg
sage, as shown by the arrow on the

Fig. 2 shows a pump operated d
from the crosshead of the engine. Ir

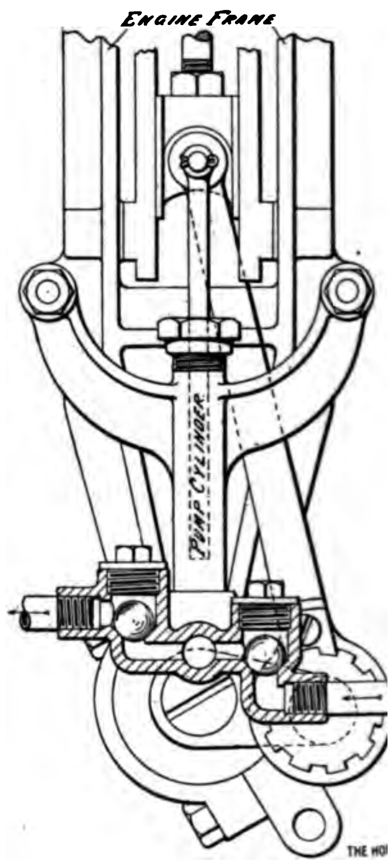


FIG. 2.

pumps the stroke is, of course, eq
the stroke of the engine, i. e., much
than it would otherwise be made—a

e cylinder is reduced in propor- : pump is bolted to the engine shown. This pump is shown with ball valves which are fre- ed instead of poppet valves.

AIR PUMPS.

ıps are made exactly the same pumps except in the one par- .t whereas in a water pump the "—that is, the space in the cyl- w the plunger when the latter is mit of its downward stroke—is made as small as possible, while pump it must be of certain size of a certain predetermined pres- ʒ maintained in the air tank. be explained by means of Fig. 3, ws an air pump A connected up

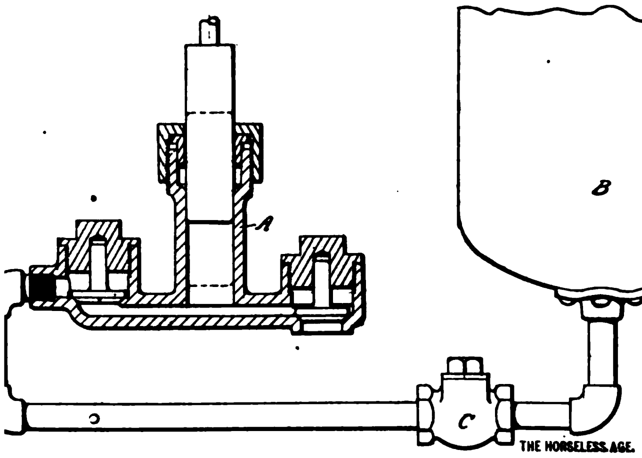


FIG. 3.

tank B, with a check valve C e leading from the pump to the : plunger is shown in its upper- :ion. Both valves are down on ; and the cylinder is filled with ıospheric pressure. In a water discharge valve opens as soon as :r begins the downward stroke, air pump the air is compressed linder, and the discharge valve s when the pressure in the cyl- ns to exceed the pressure in the n the connecting pipe. Now sup- the clearance of the pump is ne-half the volume of the stroke. pressure obtained by means of could never exceed about 55 r square inch above atmosphere. that this is the pressure in the connecting pipe. Then the dis- lve will never rise from its seat r in the pump cylinder will pass . cycle of compression and ex- rom atmospheric to 55 pounds ospheric, and vice versa, during le stroke of the plunger, and the l not act at all.

:pendent steam pumps are a com- f a steam engine and a pump.

ımobile postal service has been in Rome to connect the post :he Italian Houses of Parliament entral Post Office with the rail- n.

..COMMUNICATIONS..

Raymond's Flash Boiler.

Editor HORSELESS AGE:

Having been a constant reader of your paper since its inception, although not connected directly with any auto concern, and frequently seeing queries from readers regarding flash generators, as they are miscalled, I was tempted to install one in place of the old water tube, Roberts type, of which I send photo.

This machine was built in 1899, and has always run very well. I found, however, there were no boilers of this type to be had, so had to devise one that would have a regular down feed, and at the same time not conflict with any existing patents. The result was so satisfactory that I took out a patent, a copy of which I inclose.*

C. M. RAYMOND.

[* See Patent Department.—ED.]

Two Cycle Engine Queries.

Editor HORSELESS AGE:

The writer would like to see a discussion in your paper on the subject of the relative merits for automobile work of two cycle and four cycle engines by parties having had experience with both. I understand that it is your opinion that a two cycle motor will only develop one-half as much power as a four cycle of the same dimensions, both running at the most favorable speed.

It appears to me that if the two cycle engine gets as good a mixture as the four cycle, compression being the same, it would develop the same power at one-half the speed, as the number of impulses in a given time would then be the same for the two types of engine.

How many square feet of radiating surface are required in cooling coils per horse power of motor?

How many cubic feet of air at summer heat should be brought in contact with the radiating surface per minute for each horse power developed to keep the motor at its most efficient temperature?

What is a safe and efficient temperature to keep the motor cylinders at, and what is the maximum temperature?

What is the maximum piston speed for cylinders 3 inches in diameter; also 3½ or 4 inches in diameter? What proportion of bore and stroke would you advise using for two cycle motors?

H. J. WILLARD.

[As to the relative power of two and four cycle engines, we stated that in our opinion the maximum power obtained in the very lightest types of four cycle engines, such as have been applied to so called dirigible balloons, for instance, is double that obtained from any two cycle engines of the same dimensions. If you compare the average, medium speed, four cycle automobile engine with the two cycle the proportions are different, and the power for given dimensions is more nearly alike for the two types.

The only rule for radiating surface required we know of is that 5 feet length of the usual flanged tube is usually allowed per horse power by the manufacturers.

Regarding the most efficient and maximum practicable temperature of engine cylinders we would refer you to an article on the subject in THE HORSELESS AGE of September 25, 1901, page 548. The question cannot be answered summarily, as it depends upon many factors.

We do not know what is the best piston speed or best proportion of bore and stroke in two cycle automobile motors.—ED.]

Has Used an Automobile Two Months.

Editor HORSELESS AGE:

My idea of a motor vehicle for a physician is that it should embody all of the following points:

The machinery should be protected as far as possible against mud being thrown into it by the wheels; it should have carrying space for grips and other things necessary to our profession; it should have an air cooled motor for those living in a climate with freezing weather, as the water cooled motors will freeze up when allowed to stand out, as we are often compelled to leave them.

I find nearly all of these points in my carriage. The one criticism that I would offer is this: The engine being suspended rather low on the frame, it catches a great deal of the mud thrown from the wheels and gives some trouble in real wet weather by mud and water getting into the high speed clutch, allowing it to slip. This, however, corrects itself after a short run.

I am planning to have made for my vehicle a Russia iron protector for the engine and cylinder, allowing it to be open at the end, so as not to interfere with the intake of air for cooling purposes, but

which will protect the cylinder and gears from the greater amount of mud which would otherwise collect on them.

I have now run my carriage between 700 and 800 miles, a part of this being over very poor country roads. I have had no mishap or accident, except being stuck in a mud hole once, but I do not believe that any other carriage could have gone through the same place without trouble.

Thus far I have not expended one cent for repairs on the machinery. My gasoline and oil bills for these months, running over 350 miles each month, have averaged about $3 per month.

It is unnecessary to say that I am well pleased with my carriage, but I will look forward in a few years to many changes and improvements that will overcome many of the difficulties which some encounter. There is one improvement which I would like to see applied, and that is an attachment on the drive wheels to prevent them from slipping so easily on muddy or snowy roads. This could be placed on the outside of the tire, when deflated, and be made tense by the inflation of the tire.

GRANT HOUSTON, M. D.

Skidding—The Doctor's Ideal Carriage

Editor HORSELESS AGE:

I have read Mr. Stoddard's article on gyrostatic action with much interest, and theoretically he may be correct. I have never taken my pencil and figured it down to such a fine point, but have often taken out my runabout with a 4 horse power horizontal, slow running motor and gone over greasy clay roads at the rate of 4 miles an hour on the high gear, and any amount of manœuvring would not keep it straight. I have repeatedly stopped and started and gone as slow as possible; yet it would skid. I have gone out of the carriage to poke its nose around, and later, to save my shoes, have taken a pole to keep her straight, like a scow in the water. The only gyratory motion I was conscious of was the man with the pole. It appears to me it is more a question of force and resistance, force applied at the rear wheels and resistance at the front wheels. If one will take a skiff, stand in the stern and pole it up stream the same phenomenon presents itself—the bow of the skiff will swerve from side to side and need constant attention. What, then, is the remedy? Increase your force or traction and decrease your resistance. But how is this done? Put the bulk of your weight on the rear wheels and only enough on the front wheels to ensure a grip on the road for positive steering.

The prospective purchaser can usually do better by dealing direct with the manufacturer than with the agent. I have seen agents that "knew it all," who overawe you to such an extent that you stand like a stotenbottle and forget God gave you speech. That is just where they want you, for then you are like clay in the potter's hands. As soon as you notice this state of affairs drop negotiations at once, go home and "sober up."

I believe the best all around carriage for a doctor or anybody else should have a body with plenty of luggage room; top, curtains and apron can be added if desired, and for a doctor they are almost a necessity. It should have a folding front seat. This is more pleasant and more natural than a tonneau and can be used for an extra passenger or two. The wheels, especially the rear, should be 36 inches in diameter. The tires should be easily repaired on the road, and at present the double tube detachable kind seem to be better suited than the single tube. The motor should have two or more cylinders, be air cooled if possible, and if it is not possible to air cool it the simplest form of water cooling, such as a tank presenting a large metallic surface to the air currents, placed above the motor, should be used. This will do away with a pump and radiators. All ignition is faulty and unreliable, and the purchasing public will have to worry along as best it can until our experts evolve something better. The vehicle complete should not weigh over 1,000 pounds, and the motor should be 10 horse power at ordinary speeds. As stated above, the bulk of the weight should be on the rear wheels. There are a number of minor desirable features, but these can easily be obtained. I am now having a carriage built on the above lines and hope to be happy after thoroughly testing it.

A. G. HUIZINGA, M. D.

Experience with a Flash Steamer—Looking for Motor Trucks.

Editor HORSELESS AGE:

I wish to express my hearty appreciation of the position you are taking regarding the automobile as a useful vehicle for business and pleasure, and the decided stand against the extravagant speeding of the high powered automobiles, which is doing so much to cause those of us who use automobiles for business purposes trouble in the way of possible adverse legislation.

I have been the user of an automobile myself since May 21 last. I use a flash steam machine. I purchased it because I am somewhat familiar with steam, as we operate a large steam plant, over 1,000 horse power; we also have branches where we use gasoline and gas engines for power purposes, and I was led to choose the steam because we rarely have any trouble with the steam engine at our works, but are never without troubles with our explosive engines. I chose this particular machine because my experience with steam has been such as to lead me to prefer that the other fellow shall sit on top of the ordinary boiler, but I am entirely willing to sit above a flash boiler made of three-eighths of an inch steel pipe.

I have a very accurate odometer connected directly to the engine, wh
practical experiments, has been
over and over again to be right c
ured miles within 1 per cent. Thi
eter shows that I have used my
in excess of 6,000 miles in the six
that I have had it. My ordinary
requires its use not less than 15
any day. I have frequently used it
nary business 50 miles a day. I l
occasion to make a number of r
the country, the last one of 50 m
back, within the past two weeks.
one instance in the six months ha
to leave the machine or to have i
in. One day I blew out a fitting,
defect in the casting, when the mac
standing within a block of one of
branches. It could have been
there, but it was much easier to p
the works, a distance of 3 miles
had teams coming in, and took c
in that way.

I use double tube tires. In
stance I was delayed about two h
the road owing to a defect not
one but in three of the inner tubes
one I was using and two that I
with me as extras. Other than tha
had tire troubles on the road onl
and those insignificant and not
me at all.

ADDED IMPROVEMENTS.

Touring in the country I carry
outer tube and three inner tubes,
ring the time mentioned above
never had occasion to use them a
never had occasion to change th
tube when away. Owing to a defe
thermostat supplied with the orig
hicle, and also one which was sen
place it, I have had some little
The manufacturers replaced the
promptly, and barring the fact th
have two cast iron fittings which sh
made of tool steel, I see nothing a
machine that is not made up to
high standard of excellence. I have a
course, some improvements, as wi
other man who cares to have a ma
little nearer perfect than you can
Among those I have added has
positive feed cylinder lubricator, co
directly to the engine; an electri
to tell when the water in the tank
ting low, giving me about 2 miles
after the signal rings, and a fe
things of like character. The rec
chines of this make, however, ar
than mine, as their engines are enti
cased. I understand that next y
are going to have a compound eng
bevel gears.

IN ZERO WEATHER.

I have hitherto required three ho
greater part of the time in the sun
do my work, and the machine ha
cally taken the place of the thre
during the past season. I find, l
that during such weather as we ar
now—zero weather—a steam mach
not be used to advantage, althoug

ie did use their steam machines all inter, barring three or four below ays, and I think there would be no running my machine any days that nperature was not below 10° above The machine has been out of use these six months probably ten days tle less, for necessary repairs or re-; and about ten days more, all told, anges that I was making to adapt achine more perfectly to my pur-

n my standpoint, if these manufac- improve their machine in some very tails, their steam machine will prove st adapted for all round, everyday se, of any machine that I have ever When I bought the machine I tried the same day, one a steam machine make that had run a year and the gasoline which was new. The run out 20 miles north of Chicago and I rode out in the steam machine urned in the gasoline machine. The asoline machine was run by the sell- ent, who had had shop experience, been connected with the company veral years, and he was doing his ut the steam machine, which I ran (and I never touched one before), ound him in the sand, climbed the uicker, on level roads did better and without any noise to speak of, he gasoline machine not only balked d a vibration that was disagreeable, ition to failing in other parts as red with the steam machine.

MOTOR TRUCKS WANTED.

company has been on the lookout chines for heavy uses, machines that ce loads from 5 to 10 tons. We use ore than 300 horses, and it seems to some man should invent the right or our heavy traffic purposes. When- HE HORSELESS AGE brings to the uch a machine we will travel several d miles merely to inspect it, and if sful, we are in the market for them

president of our company, Chaun- Blair, a year and a half ago pur- an electric stanhope, which served well that he has recently bought tric brougham, and claims that the am is doing the work of three teams . Of course, he has his own instal- in his barn for transforming the t and charging the batteries of his s. JOHN BENHAM.

Twenty-two Per Cent. Grade.

HORSELESS AGE:

reply to "R. W. B's" letter on s" in THE HORSELESS AGE of De- r 3, and which I read with great in- will say the grade of 22 per cent. in es of mud, to which he refers, is of in my article in the November ie, entitled "An October Automo- ip," was as recorded by the "Victor Meter," which, although not absolutely reliable, I believe to be as nearly correct as any on the market. To be sure, there may be great errors in any reading of grades on a grade meter through the inertia of its index, due to motion of the car, but when the car comes to a standstill the index of the grade meter also comes to a standstill, and can then be fairly accurately read. This was the case on the grade referred to in my article on November 26. As the article states, we made several attempts to climb the hill, but on failing, and before letting ourselves back each time to start again, we, of course, came to a standstill, and therefore had ample opportunity to read our grade meter.

The depth of mud at this point was estimated by the following method: We had 3 inch tires on wooden wheels and felloe; therefore the distance through tire and felloe is not far from 4 inches, and the mud came to the top of this.

In this particular place the hill referred to was about 15 or 20 rods long, and therefore could not be surmounted by momentum in this amount of mud, but I believe through repeated efforts on this particular hill the wheels worked their way down through the mud on to a slate bottom, as there were many short patches of slate in the road in just this vicinity.

I generally manage to carry a rope (clothes line) with me with which I can wind the wheels in an emergency, and this has helped me out of many a tight place, in snow as well as mud, but on the hill referred to the wheels were not wound.

L.

A Sixty Mile Holiday Excursion.

Editor HORSELESS AGE:

The grocer and the artist enjoyed their last ride so much that all kinds of excuses were offered to secure another, and, tempted by the artist's invitation to a family reunion dinner at Kutztown, we started out at 10 o'clock one beautiful morning, headed northward. The sun had risen late over Mt. Penn, as is its custom, and the northwest breeze was quite cool for August, but we are not thin blooded and the cool day only promised better appetites. The road to Temple is fine, the Temple House proprietor having formerly been road supervisor (a hint to the good road loving public), but beyond this it became common and would not permit fast driving. The vehicle, a tonneau, being tested ran very smoothly for a new carriage, and we enjoyed the varying scenery and crossed from one road to another for the sake of increasing the distance. When within sight of the town, and almost within range of the odor of dinner, a sharp hiss from a front tire indicated trouble. We stopped and examined, but found nothing, the tire still being fairly hard. Examination showed a leak, however, and we could only conclude that a rock had presented a sufficiently sharp corner to puncture the tire, although the latter was of the kind supposed to be unpuncturable. Tools and repair outfit were unpacked, the nuts and one flange removed, a short section of the tube at the leak exposed and patched and the parts replaced, requiring the combined efforts of two of us about forty minutes. We reached our destination, 20 miles, about quarter after 12, met the other members of the family and proceeded to the hotel, making a second trip for the other members.

Here a first class chicken dinner occupied our time for an hour, after which we visited the State Normal School and inspected it from the well appointed kitchen in the basement to the large bell in the belfry, from which point a most beautiful view of the surrounding country is obtained. After a few short drives around the town we decided to return by the Oley Valley east of Mt. Penn, and to do this we were obliged to go about 20 miles through the broken country mentioned, following roads that were more or less rocky, rough and narrow. The windings of the little valley, the ever changing views, the fresh air, rendered dustless by a shower, constantly called forth expressions of delight from our party, while the frightened horses, in spite of our stopping whenever one was met, elicited many expressions of a contrary nature from the horse drivers. We selected the wrong road but twice, and about 5 o'clock found ourselves at Pleasantville, a termination of the Oley pike. Here we inquired for supper, but, not feeling assured as to its quality, decided to go on to Boyertown, 6 miles farther, where we had eaten before. We knew it was 6 miles to Boyertown, for a signboard had said so, and when, 2 miles after leaving Pleasantville, we met another board with the same pleasant assurance, we thought of those seven signs, all marked "6 miles to Pottstown," and wondered whether the people of this region had not purchased a job lot of 6 mile signs and stuck them up at random. We kept going, however, as rapidly as the road would permit—this is no 40 mile an hour country—hastened both by the thought of a good supper ahead and threats of a passing shower behind us.

At a fork in the road we overtook a two horse surrey loaded with two men, two women and a lot of children. When they heard us coming, instead of driving up one of the roads far enough for us to pass along the other they stopped abruptly at the fork and scrambled out of the vehicle. This being an entirely unlooked for move, we made a forced stop 20 or 30 feet behind them and awaited developments. After the family had scrambled across a wet, grassy gutter to the nearest fence and the two men had seized the horses' heads, they said "Come on," and we proceeded amid some maledictions from the women, laughable, if not pleasant. The horses seemed to be the only ones in the party not excited, and they, like ourselves, were evidently wondering what it was all about.

A little farther on we found a party at the

Oley Valley car line waiting for a car, and noticed a young man start on a run down the road ahead of us. We rapidly gained on him, however, until he disappeared behind a barn at a turn in the road around, which we came just in time to see him rushing full speed at a horse tied to the barnyard fence. The sudden onslaught scared the horse, so he pulled back vigorously, breaking the bridle at the top and stripping it downward from his head. The young man by this time had stopped, of course, and the horse, seeing no further cause for alarm, did likewise, while we, thinking the fright was over, drove on. As we passed the horse, being unrestrained, started forward, wrapping the bridle around the young man's feet as he saved himself from falling by grasping a post. This time something else gave way and the horse was free. He was still not scared, so he turned around in the road and stopped at the barn while we passed out of sight watching the young man shaking his fist at us, when we were wholly guiltless of having caused any trouble, his own fright and not the horse's being the responsible factor. Truly the worries of a horse driver are many.

We reached Boyertown a few minutes after 6, having covered the distance, 20 miles, in little over two hours; rapid traveling, the rough, narrow road and many scary horses considered. A good supper was ready and we proceeded to enjoy it, taking time only to look at the oil cups, which we found still nearly full, although the motor had shown no signs of distress and giving no evidence of insufficient oiling, behaving in this respect like an old motor.

After supper we decided not to retrace our steps to Pleasantville and go home by the pike, but to take "the front road," as it was called, as far as the Yellow House and there turn over to the pike, a distance of 2 miles, making the distance to Reading fully 20 miles instead of 18 miles by the direct road. This crossroad brought us up on an elevated central portion of the valley, with mountains hemming us in on three sides, truly a beautiful bit of landscape. The roads, however, were good, and we rapidly neared home, until as we were passing a four horse coach load of picnickers a loud report warned us to stop. The ladies thought the picnickers were drunk and shooting, but a rear tire was responsible for the trouble, having in this case blown off the rim, to the detriment of the air tube, as evidenced by a hole at least a foot long. Being of the unbolted variety and having a spare tube with us, this incident delayed us about sixteen minutes, although it was getting quite dark.

A few minutes later found us again passing the coaching party, and we arrived home without further incident, more than 60 miles with a passenger load as heavy as the vehicle itself in about five hours' actual driving over roads that are not above the average, and without trouble of any kind except with the tires. Without question the tire problem is the most serious one on motor vehicles today, and light weight with large sizes seems to be the surest solution.

CHARLES E. DURYEA.

Another Ideal.

Editor HORSELESS AGE:

Your paper has been of material assistance to me in my study of the automobile for the last three years. I will buy a machine when I find one satisfying the following specifications:

All bearings self oiling (ring oiling); two speeds forward and reverse with only three pairs of gears and only one pair in action on either speed; single cylinder; lubricator for crank and cylinder on the dash; gasoline indicator, graduated in gallons and fractions thereof; circulation of water perfect, either thermo-siphon or pump that won't freeze; automatic timing of spark; mechanically operated inlet and exhaust valves without noise; power enough in one cylinder to take all ordinary hills or grades up to 10 per cent. on the high speed forward; all gears (sliding preferred) enclosed; weight of machine, including tonneau, not more than 1,300 pounds; tires, 3 inch double; wheels, Midgley artillery; frame of machine flexible, easy riding and without reaches. "When will my dream come true?" ACE.

Superheating Bothersome.

Editor HORSELESS AGE:

Referring to your editorial and inquiries regarding superheating coils as an addition to ordinary fire tube boilers used in steam cars—if your correspondent will take the advice of one who has had experience with at least fifty cars of different sizes and types using such coils and several hundred without superheating coils, having also driven the same car with coil and without, he will look elsewhere for economy.

The superheating coils mentioned all passed from the main steam pipe down the outside of the boiler, made one loop around close under it and then led direct to the throttle valve; they were constructed of seven-eighth inch and three-quarter inch steel tubing. Some were in use at least six months and no danger of their burning out could be noticed. There was no method of regulating the degree of superheat, which was always high enough to give economy if any was to be secured, and often quite excessive. Not the slightest saving of fuel and water could be detected with ordinary measures and calculations of mileage. On the contrary, the cars appeared less lively and powerful on hills.

The greatest difference showed in the consumption of cylinder oil. A car which would use half a pint a day, and would run even if it did not get that, immediately showed an enormous appetite for cylinder oil, and let the operator know in a most audible manner upon the slightest stoppage of the very liberal supply. Cylinder oil costs money and is about as nasty a thing to handle as there is about a car. S
a man likes to operate a car with it i
of gasoline he is at liberty to do so.

I am perfectly aware that superl
is a factor tending to economy
have seen ample proof of it in stat
plants; but it is also a part of a
plant, which requires the closest reg
and attention if expensive stoppages
be avoided. This applies to engines
dinary construction. One of the g
advantages of steam turbines is tha
can use a high degree of superheat
out danger of damaging the turbin
they generally use a degree of heat
would put an ordinary slide valve
out of business in a day's run.

It is not to superheated steam that
of steam cars should look for econo
operation, but to the use of keros
fuel and extraction of the heat fro
exhaust steam as far as possible a
turning the water condensed to the t
be used over again. Both of these
tures from the earlier steam cars
passed the experimental stage and
successful operation at the present da

I have been using a car for the pa
months burning kerosene, and never
to use gasoline again, as the oil costs
less, gives a far hotter fire—so m
that the same boiler will carry 100 p
more steam—and one never worries
how full the tank is.

Condensing will in the near futu
perfected to such a degree that a
vacuum can be shown, which will re
greater power and a saving of fu
water.

I am far from denying that a
heater properly applied to a fire tube
in a steam car with accurate regulat
the degree of superheat cannot be m
show economy over the ordinary
without it, but I do insist most emp
ally that such economy will be made
expense, complication and subsequent
ble, which will more than offset the t
gain of water and gasoline.

A. L. PUTN

New Dash Idea—Experience Calcium Chloride.

Editor HORSELESS AGE:

I enclose you a photograph of a m
made for me by Haynes-Apperson
pany last year from a design which
nished them. You will notice th
dash is unusually high, being 36
from the sill. After using this m
one season I am satisfied that the p
way to build an automobile is with
not lower than is shown on this ma
There are many reasons in favor
which I think are self evident, and n
that I can think of or have hea
against it. My machine has attrac
great deal of attention on the stree
year, and whenever stopped in the
crowd is always gathered about it
have yet to hear an unfavorable co
regarding the appearance. The wi

must be figured from at least the ;ers' shoulders, saying nothing of k of the seats, which, you will no- higher than the dash. It affords carrying capacity for packages and the carriage much more comfort- storm and cold. The wheel base nachine is 106 inches, and is a most as vehicle to ride in.

not understand why tonneau ma- are so popular in this country. the engine is vertical and placed in as has been the practice largely a tonneau becomes almost a ne- in consequence of the front seat

NEW DASH IDEA.

laced so far back. Where the prac- general in this country, is to place ine at the rear or middle of the ve- d horizontally instead of vertically, ee no possible excuse for the dis- s of the tonneau. In other words, adopted the foreign design with- foreign conditions of construction roads. Those who become inter- automobiling will not be content e machine, so the reason for hav- ombination machine for four peo- wo, as may be required, disappears. now operated automobiles three and own a popular gasoline run- n addition to the machine shown

someone kindly explain to me why g car, which, as its name indicates, ded for trips of long distances, be considered complete without a ch can be closed in case of storm. driven my machine during the last through some very heavy rain- without any of the occupants being rop. Most of the so called tour- , it seems to me, are devoid of tour- forts.

ur issue of November 29 you have e regarding calcium chloride solu- a non-freezing liquid. I have re- experimented with solutions 2 to a gallon of water, 3 pounds and s. I have tested the latter to 20° ero without freezing it. The weak- ons both froze before reaching the nt.

EDMUND J. PHELPS.

The Transcontinental Highway.

Editor HORSELESS AGE:

Permit a word of approval of the article in the last issue of THE HORSELESS AGE in favor of a transcontinental national highway. For a great nation, leading the world in nearly every direction, the United States can boast of more miles of barbarous highway than all the other nations on earth combined. If Congress could be induced to appropriate to the building of national roads half as much as is appropriated in one annual river and harbor job, the sum would be sufficient to connect all the great cities of the United States by first class roads. It would construct a macadam road 20 feet wide from Boston to San Francisco, from New York to New Orleans and from Chicago to Washington, connecting all intermediate cities. It is not necessary to discuss the immense benefit this would be to internal commerce and to many lines of manufacturing. It would exceed annually many times the total cost of the highways. It would open the way for the immediate construction of thousands of miles of additional roads. Cannot all the good roads associations, all the automobile owners and manufacturers and every other friend of good highways be combined into a national force sufficiently potent to persuade Congress to appropriate $25,000,000 to be paid in five equal annual instalments for the building of national roads? I believe it could be done and that it would be the wisest and best thing the country could do for all the people.

GEORGE RAYMER.

Superheating Coils for Steam Carriages.

Editor HORSELESS AGE:

In reply to "Inquirer," in your December 10th issue, in relation to steam superheaters, I will say I have one on my machine, a 14-inch fire tube boiler. It is made of seamless steel tubing one-half inch in diameter, bent in shape to fit underneath the boiler in one coil; that is, it connects to the boiler outlet on top of the boiler, goes down the side of the boiler alongside the air tank, around the bottom of the boiler about 1 inch from the outside, then goes up to the top of the boiler again alongside of the down pipe, then turns and connects to the throttle valve. All the pipes outside of the burners and the hood on top of the boiler are packed in asbestos. I was told this pipe would not last, and that it would flake off and cut my cylinders up, but after running some over 2,000 miles, and after careful inspection, I cannot see that it has affected the cylinders at all, and so far the pipe has stood all right.

Now as to the benefits: Without the superheater I could run from 12 to 15 miles on one tank of water and 7 to 9 miles on one gallon of gasoline. Now I run from 20 to 30 miles on one tank of water, and on a trip this fall of 1,053 miles through mud and over mountain roads I averaged 13½ miles to a gallon of gasoline, and I have run on good roads 73 miles on 5 gallons of gasoline; so I know that it is a great benefit as to fuel and water economy. I bought my pipes all fitted and bent ready for putting on from a manufacturer, and if "Inquirer" will write me I will give him the address of the manufacturer. The cost was $11 and expressage.

W. H. K.

New York-Philadelphia Routes.

Editor HORSELESS AGE:

If Charles E. Duryea, in his "Routes From New York to Philadelphia" (THE HORSELESS AGE of December 10), had taken at Mt. Holly the road to Burlington, thence to Bridgeboro, Riverside, Palmyra, thence back to the Bridgeboro and Camden road at Five Points, and from there direct to Camden, he would have found a better road, although considerably further.

CHARLES S. TAYLOR.

A. C. A.'s Gordon Bennett Cup Challenge.

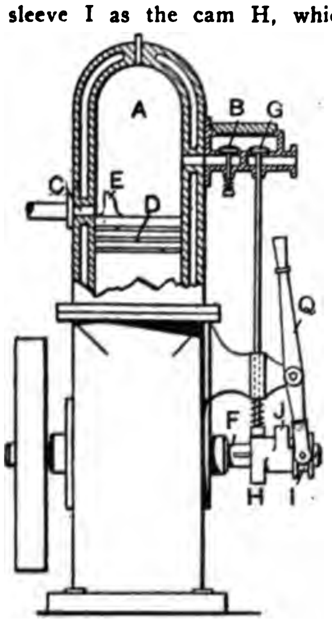
The Automobile Club of America on December 10 mailed its formal challenge for the Gordon Bennett cup to the A. C. G. B. and I., the present holder of the cup, accompanied by a check for $600, which sum will be forfeited if no contestant presents himself at the post. The club expects to send a complete team of three contestants, but only one, Mr. Winton, has yet made application for running in the contest. The race, according to present prospects, will be held either on a circular course in Ireland or in connection with the Paris-Madrid race. As of interest, in connection with the question of the possible American contestants, it may be stated that according to *l'Auto-Vélo*, W. K. Vanderbilt has just cabled an order for a Mors racer, and requested of the Mors firm to effect his entry in the Paris-Vienna race.

The J. Stevens Arms and Tool Company have opened a New York office at the station of the Westchester Automobile Company, 523 Fifth avenue.

...OUR... FOREIGN EXCHANGES

Melhuish's Reversible Explosion Engine for Automobiles.

The cut herewith illustrates a reversible explosion engine designed by A. G. Melhuish, of Edmonton, Middlesex, England. In this engine the explosive force of the charge is utilized only during one-half of the outward stroke. This is accomplished by arranging that the pressure in the cylinder is relieved at this point through a non-return valve B. The remainder of the outstroke produces a partial vacuum. At the extreme end of the outstroke a port C is uncovered by the piston D, and the new charge enters and is deflected by the baffle E on the piston D inward toward the inner end of the cylinder A, and displaces the attenuated remaining products of combustion to the piston head. On the return of the piston D half way up the instroke these products are discharged through the non-return valve B. Beyond this distance the contents are compressed and ignited, and explosion and expansion follow, doing work upon the crank shaft F. In order that the engine may alter its direction of running, there is interposed between the non-return valve and the port in the cylinder a mushroom valve G, which is operated by a cam H so disposed upon the crank shaft F that it opens this valve G at the time required for the relief of pressure and exhaust and during half the return stroke. This cam H may be either, say, 90 degrees in advance or behind the crank. On the same sleeve I as the cam H, which is

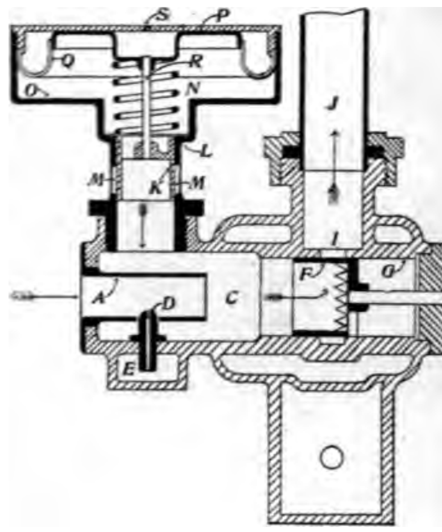


REVERSIBLE OIL ENGINE.

slidable by actuation of the hand lever Q along the crank shaft F, is another cam J in opposite phase to the cam H, so that if the cam J is slid over to take the place of the cam H the remaining exhaust gases on the returning stroke will not be able to escape by the non-return valve B by reason of the valve G not being opened, consequently the amount of compression in the cylinder A will be doubled and fired also considerably earlier. This great rise in pressure is sufficient to overcome the momentum of a light flywheel and cause the engine, by reason of the early ignition, to reverse its direction of running.—*Mechanical Engineer.*

The New Panhard Throttle Governor.

The hit and miss governor so far has been one of the distinguishing features of the Panhard system, but the latest models of this firm employ a throttle governor.



The device used is the invention of Major Krebs, the manager of the Panhard & Levassor firm, and was described in a paper recently read before the French Academy of Sciences.

The carburetor is of the constant level type and is built integral with the governor throttle valve. The cut herewith is a section through the mixing chamber of the carburetor and the throttling valve. The throttling device comprises two piston valves, one mechanically operated by the engine and controlled by the centrifugal governor and the other one operated by suction.

In the figure, the tube A is the main air inlet, into which extends from below the gasoline spraying nozzle D. The mixing chamber is indicated by C; it communicates with the intake pipe through the port I. This port is opened and closed by the mechanically operated piston rod F, with a valve rod H, once for every cycle of the engine. The travel of this valve, and consequently the amount of opening of the port I, is varied by means of the centrifugal governor, according to the speed of the engine. Above the main air intake is a tube in which there are auxiliary air intakes, MM, which are controlled by the suction operated piston valve K. The stem R of this valve fastens to another valve P sliding in a diaphragm Q. The two connected valves are normally held in their uppermost position by the coiled spring N. The chamber above the piston P communicates with the atmosphere through a small opening S, which arrangement retards the motion of the valve K. The suction of the piston causes the valve K to descend against the pressure of the spring N, and if the port I remains open long enough valve K descends sufficiently to uncover the openings N, and additional air is admitted.

The Paris-Madrid Route.

From Paris to Bordeaux there lies a stretch of 360 miles of the finest roads in the world, and thence to Biarritz, for 130 miles, there are good French roads. From Biarritz to Madrid the distance is about 850 miles over the Pyrenees. Out of this 850 miles there are stretches of 100 miles at a time where the old coach road still remains uninjured, a proof of the solidity of its construction.

These long stretches are flat and straight, over arid plains, and here again the powerful motors may accelerate to their hearts' content. But on each side of Valladolid there lie 100 miles or more of what cannot be called road. The roads have long since been washed away by the innumerable rivers which traverse the plains after a rainstorm, and which disappear soon after the rain ceases, only to leave mud and stones, which the sun soon converts into cakes of dust. The dust covers up the stones, which are only discovered as the wheel ploughs through the powdery surface.

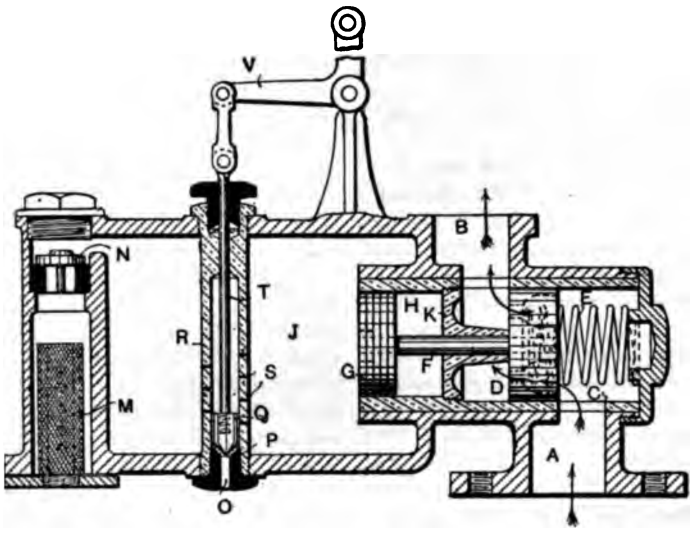
There are two ranges of hills to be traversed between the frontier and Madrid, viz., the Pyrenees and the Guadarrama. They are neither of them very formidable from the automobile point of view, but the descent of the latter presents some steep and dangerous slopes, where the greatest care will have to be exercised, and where the efficiency of the brake power of the competing motors will be tested to the utmost.—*Express.*

Brooke's Throttle Governor.

A novel governor for explosion engines has been designed by J. W. Brooke & Co., of the Adrian Iron Works, Lowestoft, England, manufacturers of the Brooke cars. The governing is accomplished by means of the exhaust gases. The exhaust is led to a chamber, where it acts upon a piston connected to a throttle valve in the gas supply pipe or conduit leading to the motor.

Referring to the illustration, A is the gas supply pipe or conduit leading from the carburetor, and B is the outlet for the combustible gas to the motor. C is a valve seating on the inlet pipe A, and D is a piston throttle valve which is normally held open and off its seating C by the spring E. The piston throttle valve D is perforated, so that when the valve is open

rom the carburetor passes inlet A and valve D to the ience to the motor, as shown ɔws. The piston valve D is the rod F of the piston G, · works in a cylinder H open to the chamber J and closed end by a fixed cover K. The s provided with an inlet L for gases or part thereof, around is a gauze screen M located in a ing a back pressure valve out- ·elief outlet O is provided for he pressure in the chamber J,) being furnished with a valve ɛceive the valve Q located in- linder R having a number of ; S in its circumference. The he valve Q is connected to a ever V for adjusting the posi- ; valve Q, and consequently



BROOKE'S SPEED GOVERNOR FOR EXPLOSION MOTORS.

the pressure of the gas within r J.

ın of this governing apparatus s: When the motor is running l speed—say, 700 explosions a ı exhausts will take place in ime, and a small quantity of ıt will be admitted through the ɛt L, thence through the gauze ɛen M, which cleanses it, and ɛ back pressure valve N into r J. The quantity of exhaust ber J creates a pressure in this vhich pressure may be kept ' allowing a predetermined the exhaust to escape from the through the relief outlet O to ir. If the explosions increase ı instead of 700, and the relief mains as before, then pressure ılate in the chamber J, and will ıe piston G, which in its turn ; the piston throttle valve D, ıe against the pressure of the on to its seating C, thereby partly closing the gas inlet A, ıg the motor to run slower ɛceiving less gas from the car- ı the meantime, there being a less number of explosions in the motor, less exhaust will be forced into the chamber J, and the pressure in this chamber will accordingly drop to its normal, thus allowing the piston G and throttle valve D to return to the initial position, and allowing the full quantity of gas to pass from the carburetor to the motor, so that the engine recovers its normal speed of, say, 700 explosions per minute.—*Mechanical Engineer*.

The English Daimler Company worked with a loss of £19,750 during the last business year.

Another long distance run on one charge of an electric vehicle is reported from France. A vehicle equipped with a battery of ninety-six Phœnix type cells covered a distance of 150 kilometres (94 miles) on the road between Paris and Vernon and back at an average speed of 12 miles per hour.

In October ten new automobile companies were registered at Somerset House, England, with an aggregate capital of $800,000.

F. W. Peckham, who represents the Oldsmobile in England, has also taken the agency for the Winton touring car and the Vehicle Equipment Company's electric trucks.

An automobile club has been formed at Bristol, England. Charles Franklin, Ash Lodge, Chesterfield road, St, Andrews, is secretary. The club started with eighteen members.

M. Schelcher is a Parisian who owns an automobile which is painted red and yellow. It was "in court" recently, says the *Figaro*, at least to the extent of being brought into the courtyard of the Palais de Justice. M. Schelcher had been cited for excess of speed by a policeman who testified that the color of the automobile was gray. The judge ordered the automobile to be operated in the courtyard in order to convince himself whether it looked gray while in motion, as the public prosecutor had suggested as a possibility. The automobile remained red and yellow, and M. Schelcher was allowed to drive away without paying a fine.

In connection with the Gordon Bennett cup race the sports commission of the Automobile Club of Belgium has recommended to the automobile clubs of France, England and Germany the itinerary of the circuit of the Ardennes.

The Western section of the Scottish Automobile Club at a meeting on November 17 listened to the first of a series of lectures on automobile subjects arranged for the winter season. The lecturer on this occasion was H. M. Napier, and the subject, "Motor Troubles and How to Get Over Them."

The yearly output of De Dion-Bouton cars and frames is approximately 2,000, and of engines 5,000. The total number of cars or frames made to date is 6,000. The total number of motors made to date is 33,000; this includes motors of all kinds, from the old 1¼ horse power air cooled tricycle engines of some years back.

The Passe Partout left Moscow on November 5, but had to lay over in Wladimir on November 7, as the cooling water had frozen in spite of an addition of 14 per cent. of glycerine. On November 9 the journey was continued to Nijni-Novgorod. A correspondent of the Russian journal, *The Automobile*, is accompanying the tourists.

The Deutsche Magnalium Gesellschaft has patented a process with the object of increasing the mechanical properties of aluminum. This process is interesting in the sense that it opens up a view to the possibility to adapt aluminum to new uses in giving it certain qualities of endurance and resistance, which are wanting in its pure state. It is well known that aluminum works badly with certain cutting tools and files. It has been shown that the alloying of aluminum and magnesium has a marked superiority over pure aluminum, but it is less malleable and ductile. The authors observed that if aluminum is allied to 2 to 10 per cent. of magnesium the metal obtained is hardly to be distinguished from aluminum, but when this alloy is passed several times through a flatting mill, heated each time toward 400-500° C., its principles are modified. The alloy cuts and files as well as though it was charged with magnesium. It has preserved, on the other hand, the ductility and malleability of pure aluminum.—*Mechanical Engineer*.

LEGISLATIVE AND LEGAL.

J. G. Lowell, Los Angeles, Cal., who was arrested for running his automobile too fast, pleaded guilty and was fined $10.

For resisting an officer, etc., William Morrison, Chicago, Ill., was fined $25 and costs and censured by the court on December 13.

Oyster Bay, L. I., December 1.—Three more arrests of automobilists have been made here for speeding—Colgate Hoyt, G. Brown and W. L. Storm.

Buffalo, N. Y., November 25.—The automobile ordinance will be considered at a meeting of the committee on ordinances next Wednesday afternoon.

T. P. Curtis, Cambridge, and H. L. Pope, Hyde Park, Mass., were recently fined $25 each by the Boston authorities for speeding over 10 miles per hour.

Riverhead, L. I., November 29.—The price paid by the County of Suffolk for information regarding violation of the automobile speed law has been cut from $50 to $25.

Saginaw, Mich., December 1.—The automobile ordinance came up before the council at its last meeting, but was sent back to the committee for further consideration.

Mason Crocker, chauffeur for Reginald Vanderbilt, New York, has been discharged from arrest for alleged violation recently of the automobile speed law on Long Island.

The Westerly, R. I., town council are urged by the liverymen to adopt an ordinance forbidding the use of the steam 'buses now running there under a penalty of $5 for each offense.

New York, December 2.—Damage suits for $85,000 have been brought as a result of the accident, recently reported, in which the automobile of Frederick C. Havemeyer dropped into an excavation near Elmhurst, L. I.

Savannah, Ga., automobilists are securing signatures to a letter calling upon representatives from Chatham to oppose the legislative bill to prevent the use on public roads of vehicles propelled by any other than animal power.

Saratoga, N. Y., December 6.—A trust mortgage for $450,000, executed to the North American Trust Company, of New York, was filed for record here today by the Fournier-Searchmont Automobile Company.

Buffalo, N. Y., December 2.—The suit of the Electric Storage Battery Company against the Buffalo Automobile Station Company, William Hamlin, Arthur R. Pennell and Edward L. Brady to restrain the defendants from using the Porter storage battery came up here today. Judge Hazel granted the injunction, but immediately suspended it upon the defendants giving a bond of $10,000 to cover any damages that may be recovered against them.

New York, December 8.—Three automobilists were arrested on Pelham avenue on the 6th inst. for speeding and arraigned in the Morrisania court today. They were held in $300 bail each for trial.

Babylon, L. I., December 4.—A fine of $40 was inflicted today upon Arthur K. Bourne, of New York, by Justice J. B. Cooper, for having exceeded the 8 mile speed limit in the village streets on Sunday last.

In the Cord Meyer automobile case at Hocksville, L. I., the justice concurred in his counsel's contention that there had been no "willful" violation of the law regulating speed and dismissed the complaint.

An ordinance, modeled after the Cleveland, Ohio, ordinance, is pending before the city council of Peoria, Ill., and provides for the registration and numbering of automobiles, etc., under a penalty of $100 for violation of any or all of its sections.

Middleton, Conn., November 29.—The property of the Eisenhuth Horseless Vehicle Company has been attached in the interest of Henry Metzger, a former employee, who has brought suit, claiming $10,000 damages for injuries received while in the employ of the company.

Boston, Mass., December 1.—Seven automobilists were fined $10 each in a court at Roxbury yesterday for exceeding the speed limit of 10 miles an hour on Commonwealth avenue. The police claimed that they timed them and found that some were exceeding 17 miles an hour.

Babylon, L. I., November 30.—Arthur K. Bourne, of New York, was arrested here today for exceeding the 8 mile automobile speed limit. He pleaded guilty and was fined $40, but was persuaded by two prominent clubmen to change his plea to not guilty, and was then paroled until December 4.

In the replevin suit of Dr. E. A. Lawbaugh, Portland, Ore., for possession of an automobile shipped from Chicago, the O. R. & N. Co. and A. C. Banker have filed an answer that it received a draft for $236 to collect in favor of Banker and that the company has the right to hold the automobile until it is paid.

Owing to the recent accident, in which two persons were badly injured by a runaway automobile and to the inability of the officials to secure the name of the chauffeur, the city council, Chicago, Ill., have passed an ordinance requiring all automobiles to be numbered and registered under a cumulative penalty of from $10 to $50.

East Williston, L. I., December 3.—W. L. Stow, of Westbury, who was arrested on the Jericho Turnpike on Saturday last for automobile speeding, appeared before Justice Foster L. Oakley here yesterday. He pleaded guilty and was fined $20. G. Brown, arrested for the same offense, same place and date, also pleaded guilty and was fined the same amount.

The aldermen of Colorado Springs, Col., have an auto ordinance in band.

New York, December 9.—The bicycle policemen in the Bronx have been ordered to wear citizens' clothes to facilitate the enforcement of the automobile speed law.

New York, December 6.—It is thought that the law committee of the Board of Aldermen will report favorably on the ordinance increasing the automobile speed limit from 8 miles to 10 miles an hour, in spite of the opposition of the committee of fifty. It is learned from the same source that the licensing ordinance will be reported on unfavorably.

A. C. A. Lecture.

The second lecture of the season was given at the Automobile Club rooms on Tuesday evening, December 9, President A. C. Shattuck presiding. In opening the meeting he announced that the club would send a challenge to the Automobile Club of Great Britain for the Gordon Bennett cup. He also spoke of recent advances in the good roads movement. Congressman W. P. Brownlow, of Tennessee, has introduced in the House of Representatives a bill calling for an annual appropriation of $20,000,000 for the construction of improved roads. The bill resembles in many respects the Higbie-Armstrong bill in New York State. The appropriation is to be divided among the States according to population, so that the share of New York State, the population of which is about one-tenth of that of the whole country, would amount to $2,000,000. The amount appropriated by the National Government is to be duplicated by the States and counties. This bill meets the approval of the club and also that of the A. A. A.

The lecturer of the evening was J. Dunbar Wright, chairman of the foreign relations committee. Mr. Wright toured extensively last spring and summer in the countries adjoining the Mediterranean, and in his lecture, which was very much appreciated, dealt with this tour. It was illustrated by several hundred lantern slides of scenery and buildings in the countries visited.

Mr. Wright went from New York to Madeira, Canary Islands, and from there to Funchal, Gibraltar, Tangier, Algiers, Granada, Cadiz, Seville, etc. It appeared that the means of locomotion employed were generally of the older order. In Algeria the roads were excellent.

At the conclusion of the lecture a vote of thanks to Mr. Wright was moved by W. E. Scarritt and carried unanimously. Mr. Wright's lecture covered only the first half of his trip, and will be continued on the next lecture evening, Tuesday, December 23. A trip through Sicily will then be described, as well as Mr. Wright's experience in the Paris-Vienna race in the tourist section.

h Steam Generators.

3Y J. S. V. BICKFORD.

ic generally, and even some very engineers, are not at all well in- the subject of the above class ors, and for this reason some d upon the writer's experience g and using such generators will ot be out of place.

ple the flash generator is a heat- elongated vessel into which wa- ted at one end, issuing at the e form of steam. At first sight of generator seems eminently motor car work. Its advan- ar to the uninitiated something

t be exploded; it requires no s to be watched; it suffers no owed to become empty and it is automatic in action. All that is s to get up the fire, start with a of the hand pump, when the ses instantly and the engine is d then the engine pump keeps sure.

ie theory of the action, but it is emotely what happens in prac- pose to give a short account of steam generators of this type ve designed and tried, with the

first thought of trying this type r for automobile use it naturally me that they would very soon and the first experiment tried view to settling this point. It n that such a generator, having am drum nor water drum, can markably cheaply. As a matter ouple of men with proper appli- nake the whole of the internal generator of 30 square feet of rface in about one day. The ch a boiler only costs about 8 foot run, and, being one-half e diameter, the total cost of the face comes out to not much It would therefore be possible generator in a practical automo- f the whole generator coils had ed every three months.

to gain some information as to nd tear of such a generator I l boiler on the following lines: rator itself was made of five- n outside by three-eighths inch rawn steel tube. This tube was three concentric coils as fol- , three turns were made around about 8 inches in diameter, so of three coils resulted. Out- as wound another helix in the ction, and outside that a third e same direction as the first. ter entered at the bottom of the er coil it would flow upward it, then downward through the nd finally upward through the oil. For clearness I have de- e coils as cylindrical, although in fact they were square in plan view. This was done in order to allow the joints of the tubes to be made on the straight, as it was found very difficult to get any joint to stand bending in the lathe around a mandrel, though this size tube itself could be coiled up with ease in a 6 inch lathe with back gear, around a 7 inch mandrel. The set of three coils above described we will call one element. Three such elements went to make up the complete generator, and they were coupled up by brass unions outside the generator casing, so that the lower coil could be removed for cleaning or renewal. The unions failed at once and had to be replaced with steel connectors; no brass can be used in the steam end of a flash generator, on account of the excessive heat. Above the generator, in the smoke stack, was mounted a feed heater of copper pipe.

The heating surface was as follows: Generator coils, 14 square feet; feed heater, 4 square feet, and steam drum and connections, 2 square feet; total, 20 square feet. The path of the water and steam was capable of variation by altering the connections. It could either be made to flow downward through the feed heater and downward through the generator coils; upward through both, or upward through one and downward through the other. The steam, on leaving the final coil of the generator highly superheated, entered the top of a small steel steam drum 2 inches in diameter, and the steam for the engine was taken from the top of the same drum. This drum was intended to act the double part of storing steam and removing solid impurities from it, for it must be remembered that, since nothing in the nature of scale forms in a flash generator, all solid substances or salts in solution in the water pass on with the steam in the form of dust. I am informed that a leak in a steam pipe of a generator of this type supplied with London hard water immediately whitens anything held in it with a deposit of chalk. Some arrangement for removing this solid is therefore advisable for the good of the engine. For experimental purposes the generator described was supplied with water from the town mains at a pressure of 50 pounds per square inch; and there was a non-return valve in the supply pipe and a pressure gauge.

The first experiment was on the durability of the boiler. The heat was supplied by a petroleum bunsen burner, only capable of heating the coils, if empty of water, to about 1,500° F., and water was turned on at full pressure, the supply being regulated by passing the steam through a small hole. The generator was then left to itself for nine hours per diem for a month. Sometimes the water company turned off the water and the whole apparatus got red hot, and at other times it would flood, for it was not being closely watched. It may at once be said that we did not wear out the generator and have not done so yet, though it has had shocking treatment and very heavy use since. Consequently I think that for durability there is little to complain of. It was early discovered that the steam drum was neither necessary nor advisable and it was removed.

Experiment No. 2 was on the efficiency of the generator. The steam was passed as before through a small hole and the oil pressure to the burner regulated till the generator just did not prime. After it had been shown that the right adjustment had been reached the end of the outlet tube was introduced into a surface condenser cooled by water, and the condensed water and consumed oil measured, the oil vessel being fitted with a gauge glass for this purpose. The temperature of the steam pipe was repeatedly tested during the experiment and found to readily melt solder, and later experiments showed that it was very easy to detect by the noise if the generator was priming or not. The result was that with the generator coupled up so that water flowed through the feed heater and then up through the boiler, 1 pound of oil evaporated about 8½ pounds of water, the actual quantities being 11 pounds of water evaporated in seventeen and a half minutes and a consumption of oil of 4 to 4.4 pounds per hour. The output of steam is, of course, low for the heating surface.

After this preliminary experiment an hour's run was made with the following results: After running twenty minutes, to make sure there was no priming, the test was started and the quantities of water condensed at the end of each fifteen minutes were respectively 10, 9, 10¼ and 10½ pounds; total, 39¾ pounds per hour. Oil used, 5.22 pounds; that is, about 7.7 pounds of steam per pound of oil. These experiments were made in 1900 and I find the following note in my book:

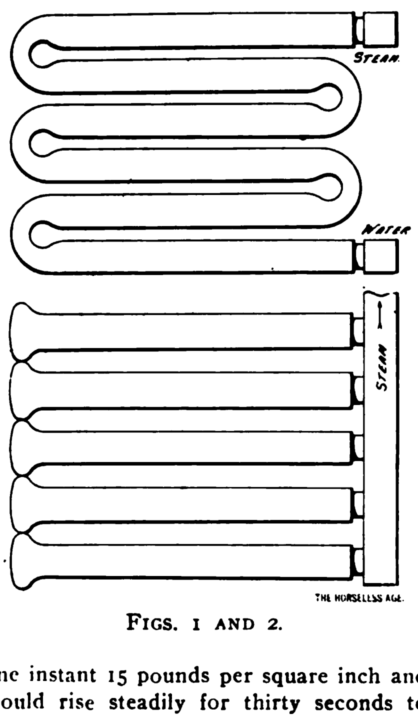
"In this experiment the oil consumption was kept high to prevent any possibility of priming, as with the condenser on it is impossible to see whether the boiler is priming or not. Under similar conditions it was found without a condenser that the boiler gave dry steam with 4.4 pounds of oil per hour, or about 9 pounds of steam per pound of oil."

I think that this sentence is a somewhat severe condemnation of this type of boiler as far as efficiency is concerned, for it is obvious that the same objection to economical oil consumption applies with an engine on as with a condenser. This is, in fact, one of the objections to this type of generator: You cannot see what is happening; all you can do is to put a pyrometer in the steam pipe and regulate the boiler by the steam temperature. It must be remembered that if too great a demand for steam is made on these boilers they do not drop their steam pressure, but deliver water instead of steam, and here lies the reason for some of the astounding statements made about their economy. I have seen it stated in the technical press

that they will actually make 37 pounds of steam per square foot of heating surface per hour and something like 18 pounds of superheated steam per pound of oil. This latter statement is, of course, absurd on the face of it, as the theoretical possible output of superheated steam of, say, 600° Fahr. is only 15 pounds per pound of petroleum. The mistake is, however, easy to make, as, if the generator only delivers a little water occasionally, the results may be absurdly out. In practice these generators have always to be worked with a large excess of heat to insure their not priming and having a reserve for emergencies.

The third experiment was with the same boiler coupled up so that the water flowed up through the feed heater and then downward through the generator. The result was that about 10 pounds of water were evaporated per pound of oil. It may at once be said that this was quite the best result obtained, and in actual use we never approached it.

In the above experiments the steam pressure did not exceed 35 pounds average, the fluctuations being very considerable. The feed, as stated, was at 50 pounds per square inch, so that the balance of 15 pounds per square inch was lost in forcing the steam through the boiler coils. The fluctuations ranged between 15 pounds and 50 pounds per square inch, a complete cycle occupying perhaps one minute. That is to say, a pressure gauge on the steam pipe would show at



FIGS. 1 AND 2.

one instant 15 pounds per square inch and would rise steadily for thirty seconds to 50 pounds per square inch, then steadily fall again to 15 pounds, and would continue to do this.

The fluctuations of steam pressure are somewhat different when the generator is being supplied by a pump run off the engines it is driving, for some unknown reason. In that case the generator described when set to work at 275 pounds per square inch fluctuated between 250 and 300, the fluctuations taking about one minute, as before.

These fluctuations of steam pressure are not in themselves of much importance in motor car work, as the road resistance varies so much itself that fluctuations of speed due to this cause overlap and obliterate fluctuations due to the changing steam pressure.

The next boiler made was what might be called a semi-flash type, being partly a water tube. It consisted of about nine

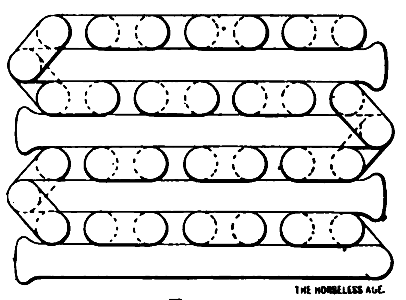


FIG. 3.

elements, each element being constructed as follows:

About 10 feet of seamless drawn steel tube of 1¼ inch bore was doubled up into a zigzag, something like a Bellville element, but no precautions were taken to keep the tube from collapsing, except running a couple of one-eighth inch wires through it before bending. Fig. 1 gives a rough idea of an element, showing an elevation thereof, while Fig. 2 is a plan view.

These elements were coupled up in parallel to two headers, into the lower of which the water was fed after passing through a feed heater placed above the generator proper.

Before coupling this boiler up for final use it was tested for steam fluctuations coupled up in different ways. (a) It was coupled up in series (Fig. 3), heated and connected to the town supply at 50 pounds, the water flowing downward through the generator. The fluctuations were between 50 and 60 pounds per square inch, occupying about two minutes. (b) Same connections, water flowing upward. Action as before. (c) Coupled up in parallel, water flowing upward (as already described). Worked all right; fluctuations not much different, but generator was more inclined to prime. (d) Same connection, water flowing downward. Would not work at all; primed at once.

It is not difficult to understand why this style of connection (c) is more likely to prime than the other. The action of these generators is that of cold water on red hot metal. Now, when the water first touches the hot metal it flashes into steam, causing a miniature explosion, which drives the water back from the tube. When more than one tube is connected in parallel the water will be driven to the colder tubes, and the effect to be is that the coldest tubes will b This is what actually happens. be remembered that these gener not work like a water tube boiler, any water entering the steam d through the down comers and the generator. In these gener friction in the tubes is so gre very heavy excess of pressure maintained in the water end of t ator to force the water and stean it, so that if anything in the na cold down comer is provided i act as a down comer, but as a so circuit through which the water as water, instead of passing th generator coils. The same reaso the use of a gauge glass impossi the water would pass through glass to the steam end of the stead of going through the gener

It may at once be said that mentioned boiler was never prop on a car. It was tried and c and there is every reason to sup it would not have answered, b know that in no case was the had under it powerful enough t I have never considered it wort try it again.

At about this time I saw it re ed in a contemporary to use son the nature of a baffle inside the I decided to test this. I made a element as just described, placin rolled up piece of iron wire gau bend AA, Fig. I. The result was before. Only one interesting fac covered and that was that wher ments were connected in parall tuations were much more vio

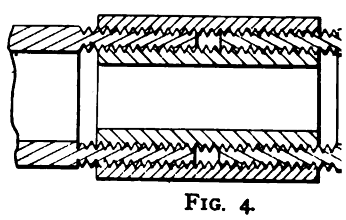


FIG. 4.

where they were either worked or in series. I attribute this to t of water from one coil into The feed was downward, as fro Fig. 1.

Eventually the type of generat on was one consisting of small throughout in series. The term is employed as in electrical wor ing that all the water entering ator passes through the whole of while when "in parallel" the w vided, part going through each generator.

The actual bore was th inch and outside diameter five-ei The joints were made with m (a preparation sold in London, so hard that the threads will st they can be unscrewed), a

, as per sketch, Fig. 4. It will be at there is not only a socket out- tubes, but also a nipple inside. I er known anything like a leak to

e whole, I am inclined to think is about the best type of flash r, and it should be fed downward. upward feed the temperature of n is no guide to what is about to Thus the steam temperature may Fahr. at one instant and within conds the generator will be prim- hen a flash generator primes the ig to do is to stop and let it boil pty again.

s been stated above, before the generator was finally put in posi- as tried coupled in series. When ound that the generator as finally was not suitable I reverted to this ent and tried it on the car both up for upward and downward flow . When coupled up for upward action was practically the same as l tube generator, except that the ns of pressure (as noted when the at rest and the engine running e not so rapid. One peculiarity, was noticed when the same gen- as arranged for downward flow. uations would be less violent for nutes, and then, after perhaps ten or so, the pressure would sudden- to fall and go right down from o to 100 pounds, and then slowly n to 250. It will at once be seen lefect is practically prohibitive, and sired to use a large tube generator ntial that it be coupled up for up- v. This, however, does not apply tube generators. The only advan- large tube is that there is a small f steam and hot water in the gen- r starting and hill climbing.

ons Governing Entries in the ted States for the Gordon Bennett Cup Race.

ries from the United States are to be made through the Automo- of America. The Automobile America has accepted and nom- e entry for the Gordon Bennett presumed to be Alexander Win- y are open to receive further en- n which two will be nominated, following conditions:

Each entrant shall deposit with he sum of $600.

. The racing committee of the decide which of the entrants not ted may compete in the cup race. sion may be arrived at by a con- y the committee without a con-

Any entrant who is not nom- the racing committee for the shall have his entrance fee re- him.

Any entrant who, after being nominated for the cup race by the committee, does not start shall forfeit his entrance fee of $600.

Fifth. If three entrants are nominated to take part in the cup race, each entrant shall have two-thirds of his entrance fee (after deducting his proportion of the expenses incurred in holding the race) returned to him; provided he starts in the race.

Sixth. If two entrants only are nominated, each of such entrants shall have one-half of his entrance fee (after deducting his proportion of the expenses incurred in holding the race) returned to him, provided he starts in the race.

Seventh. These rules are supplemental to the rules of the Gordon Bennett cup race, by which each entrant agrees to abide.

The Herschmann Trucks to Be Manufactured.

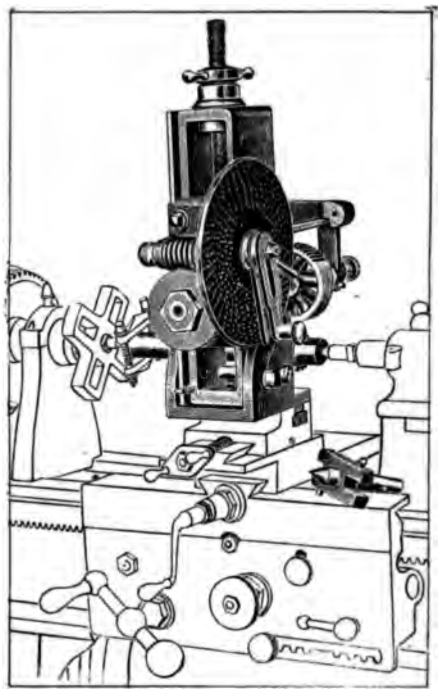
Arthur Herschmann returned from Europe on the Philadelphia December 6. He has taken out patents on his steam truck in all European countries and the trucks will be manufactured by the Mytholm Steam Wagon Company, Limited, of England, and the Hungarian Railway Machine Company, of Raab, Hungary. The trucks will be turned out in special designs to adapt them to various climates and countries. The American Steam Wagon Company is now preparing to extend the exploitation of the system in this country and will begin to accept orders in a few weeks.

Experimental Steel Road.

The first section of the experimental steel road, on Murray street, between Broadway and Church, was practically completed on December 11, when the last rail was laid by Major Jones, U. S. A., and it is now in constant use by the heavy trucks which form the greater portion of the traffic at that point. Truckmen state that great relief is afforded their horses by the smooth rails in ascending the grade, and no difficulty is experienced in turning out of or into the track. Teams going up are, of course, given the right of way.

The Barnes Universal Gear Cutting and Milling Attachment.

This gear cutting attachment, manufactured by W. F. & John Barnes Company, can be easily attached to lathes; adjustments can be made to obtain any desired angle. Its range of work consists of cutting mitre, bevel and spur gears, fluting taps, reamers or counterbores, milling cutters, etc. Equipped with an ordinary chuck it can be used for slitting screws, bolts, etc., and other varieties of milling work. This attachment will cut gears as



Barnes' Universal Attachment.

large as the lathe will swing. The Brown & Sharpe or any other standard milling cutter can be used. The hole in the spindle is B. & S. No. 7 taper. An index is furnished with the attachment, cutting nearly all numbers up to 360.

Trade Literature Received.

Motor Cycle Supplies.—Harry R. Gear, of 1017 Pine street, St. Louis, Mo.

Pokorney's Mixing Valve.—H. Pokorney, Hovey street and Belt Railroad, Indianapolis, Ind.

The Ball Transmission Gear for Automobiles.—The New York Gear Works, 56 Greenpoint avenue, Brooklyn.

The Case Automatic High Speed Steam Engine (for shops and charging plants).—The New Britain Machine Company, of New Britain, Conn.

Dynamotors and Motor Generators.—The Holtzer-Cabot Electric Company, Brookline, Mass.

Thread Milling Machine.—Pratt & Whitney Company, of Hartford, Conn.

The "American" Motor Carriage.—American Motor Carriage Company, of Cleveland, Ohio.

"Important Information Regarding Charging Electric Automobiles."—Circular of the Pittsburg Equipment and Supply Company, Keystone Building, Pittsburg; manufacturers of gasoline engine generator plants for charging automobiles.

Dr. Lucke denies the report, recently circulated in automobile publications, that an automobile engineering department will be established at Columbia University. A series of lectures will be given on gasoline engines,

MINOR MENTION

An automobile company, capitalized for $400,000, has been projected at Waukegan, Ill.

The Taunton (Mass.) Automobile Works have assigned to Daniel L. Brownell.

A new automobile stable will be built for F. T. F. Lovejoy, Pittsburg, Pa., at a cost of $175,000.

B. V. Covert & Co., Lockport, N. Y., write that they have reduced the price of their motorettes to $500.

Strathroy, Ont., will vote on a bylaw to loan $12,000 for the establishment of an automobile factory.

A. L. Dyke has brought out a spanner wrench which he claims will fit any standard spark plug on the market.

Four automobiles are to be used in transporting the public from the cars at Newport, Ky., to the race track.

The Automobile Club of Philadelphia, Pa., has secured club rooms on the second floor of the Penn Square Building.

The Standard Motor Vehicle Company, New York, has been incorporated at Dover, Del.; capital stock, $1,000,000.

A firm manufacturing automobiles in Michigan is reported to have made a contract with the Post Office Department to carry the mail from Knoxville to Sevierville, Tenn.

The Canton (Ohio) Auto Company have received notice from the Post Office Department that they have been awarded the contract for carrying the mail between the post office and depots.

The Rochester Automobile Club has issued a large, well printed map of the roads in Monroe County, showing in colors the roads which have been improved under the Higbie-Armstrong bill.

W. J. Stewart, chairman of the race committee of the A. A. A., is authority for the statement that because he neglected to get a permit from the association the records made by Barney Oldfield at Detroit will not be accepted.

A reunion dinner of the participants in the Reliability Contest will be held at the New York Athletic Club on Monday evening, December 22. The committee, who undertook to present a testimonial to S. M. Butler, have raised $450 and purchased a stopwatch, which will then be presented.

The Central Passenger Association, which embraces practically all of Illinois, Indiana, Ohio, Michigan and all points east of Pittsburg and Buffalo, has granted a rate of a fare and a third on the certificate plan for the good roads convention of the National Association of Automobile Manufacturers, to be held at the Coliseum during the Chicago Show, February 14 to 21, 1903.

Banks Brothers, Wilmington, Del., have secured the agency for the Oldsmobile and will open a station at 807 Orange street.

Contracts have been let for erecting an automobile repository, 35x100 feet, on National avenue, Milwaukee, Wis., for the Jonas Cycle Company.

A line of twelve motor coaches will be operated between Lincoln Park and Adams street, Chicago, Ill., by the American Motor Coach Company.

Charles M. Starr, South Bend, Ind., will remove to South Lafayette street, where he will erect a building and make a specialty of repairing automobiles.

Announcement is made of the removal of the Boston office of the Locomobile Company of America to 13 and 15 Berkeley street on or before January 1, 1903.

Mr. and Mrs. J. L. French, en route by automobile from St. Louis to Orlando, Fla., have reached Nashville. On Thanksgiving Day they scaled Mt. Eagle, 3,500 feet high.

The Cadillac Automobile Company of Illinois, Chicago, has been incorporated; capital, $10,000; incorporators, Walter E. Chamberlain, George L. Wilkinson and H. S. Gaither.

Delegates to the meeting of the American Automobile Association have been elected by the Rhode Island Automobile Club, Providence. Five new members have been elected.

It has been decided by the Toronto, Ont., board of fire underwriters that an extra rate shall be charged on all buildings used for the storage of automobiles using gasoline, according to the quantity of gasoline on the premises.

The Fisher Automobile Company will erect at 300 North Illinois street, Indianapolis, Ind., a two story brick building, the upper story of which will be used as automobile clubrooms and the remainder as a storage and repair station.

A. A. De Loach, William Owens and V. H. De Loach are the incorporators of the De Loach Varispeed Company, 400 Highland avenue, Atlanta, Ga., with a capital stock of $100,000. It is reported that the new company will manufacture heavy gasoline motor trucks.

The Waterloo Motor Works, Waterloo, Ia., has been incorporated to make automobiles; capital, $200,000; officers, J. R. Vaughn, president; O. V. Eckert, vice president; A. Lipton, second vice president; G. B. Miller, secretary, and F. B. Ballou, treasurer.

The N. A. A. M. at its last meeting decided to call a convention of the automobile trade at the Chicago Show, with a view of introducing a bill in Congress making an appropriation of $20,000,000 for a transcontinental highway, the expenses of construction to be shared equally by the National Government, the States and the counties.

The Waltham Manufacturing Company, Waltham, Mass., have raised the price of their Orient motor cars from $1,000 to $1,200.

The Morgan Motor Company, of Worcester, Mass., have worked out a system of interchangeable bodies for motor trucks which permit the truck to keep running practically all the time, the body being taken off for loading and a loaded one taken on by means of "station slips."

The Bethlehem (Pa.) Automobile Club has been organized with the following named officers: President, Thomas Weiss; vice president, Francis Weiss; secretary and treasurer, William E. Martin. Clarence A. Wilson has been appointed consulting engineer..

A. A. Geisel has bought out the Automobile Headquarters at 36 and 38 Dwight street, Springfield, Mass., and is having plans drawn for an addition 90x40 feet, with a second story in front 40x30 feet, the latter for use as clubrooms by the Automobile Club.

The executive officers of the Mobile Company of America and also of the Mobile Rapid Transit Company will hereafter be located at Broadway and Fifty-fourth street, New York, where they have taken a lease of the entire building for a showroom and a storage and repair business.

Mr. Maltby, the Brooklyn, N. Y., dealer, has two schemes for solving the problem of automobile sleighing, (1) by putting the chain upon a shaft on skeleton runners, the shaft to hold a steel wheel with projecting arms held by a spring, and also flat tires with toothed surfaces, and (2) by putting a toothed wheel on each side of the sleigh in the middle.

The following ticket has been nominated for the coming year by the Long Island Automobile Club, Brooklyn, N. Y.: President, L. R. Adams; vice president, Lawrence Abraham; secretary, Read Holliday; treasurer, Edwin Melvin; board of governors, J. Adolph Mollenhauer; Nathaniel Robinson, M. D., Read Holliday, F. G. Webb, Lawrence Abraham and L. A. Hopkins. Committee on admissions: A. R. Pardington, W. N. Nafis, M. D., and E. C. Seed. The election takes place on December 17.

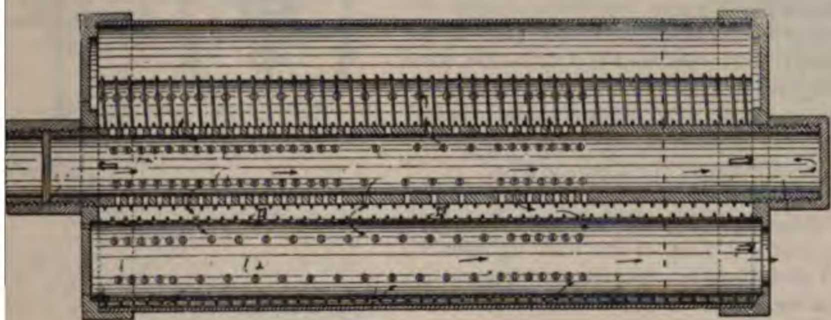
The American Veneer Company, of Jersey City, N. J., make wood automobile mud fenders in any size and shape required. These are made by gluing together under heavy pressure three pieces of whitewood, each one-eighth of an inch thick and the grain of the centre piece crossing at right angles the grain of the outside, forming a composite structure, which, it is said, cannot be split and will not shrink or crack. The same firm make the so called "plow share twist" front fenders in wood.

OTOR VEHICLE ATENTS..

United States Patents.

28. Exhaust Muffler.—William of Brooklyn, N. Y. November 25, Filed January 23, 1902.

muffler consists of a casing within is located a tube closed at one end apted to be connected at the other e exhaust pipe, with a plurality of eripheral perforations arranged in line around the same from adjacent nlet end to within about one-fourth gth from the closed end. Around coiled under tension a spiral spring ient spring wire, the coils of which with the perforations, so as to e gases issuing therefrom. Parallel is tube are arranged similar per- tubes provided with like perfora- d baffling springs, which are in free nication with the atmosphere at one ends, all of which tubes are en- in a tight casing in such manner that the gases pass from the inlet or central tube through the perforations into the casing, thence by the like perforations into the outlet tubes, in each case impinging upon the baffling springs, from the ends of which outlet tubes they escape into the atmosphere.



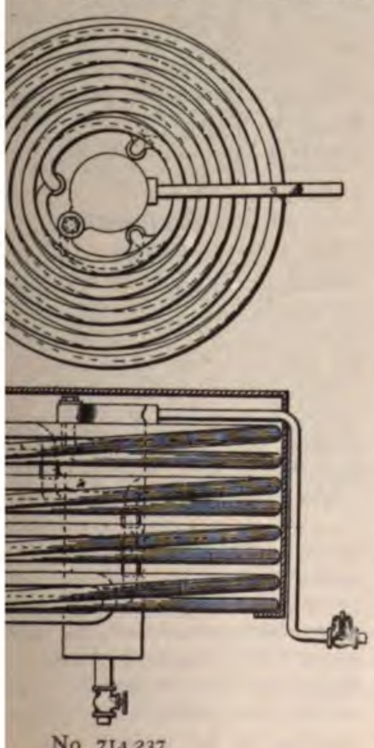
No. 714,128.

714,237. Steam Boiler.—Charles M. Raymond, of Cleveland, Ohio. November 25, 1902. Filed July 3, 1902.

Relates to the coil boiler of the Raymond steam carriage. The water is entered at an upper coil and the steam delivered from a lower coil or the hottest part of the boiler. The various coils are connected by risers, so that although the general course of the water through the boiler is downward or toward the fire it must intermediately pass upwardly through one or more risers, forming traps, whereby the steam in the lower coil or coils is trapped from the water in the upper coils and cannot displace the same or allow it to run down into the superheating or steam coils before it is forced there by the pump.

The water is trapped so that it cannot draw or back out of the boiler, pocket steam, or admit air into the coils, since unless air or some other medium is admitted to the upper coil or coils the water or other liquid being vaporized cannot move downward without forming a vacuum in upper part of the system.

The water is supplied to the lower coil of the upper set by connection with the top of a central header to which water is supplied by the feed pipe, having the usual check valve, which valve is placed at a point lower than the bottom coil. Then, since the feed pipe is normally filled with water, should the pump or other feeding apparatus be disconnected or leak, the column of water in said pipe will move downwardly and either form a vacuum at the upper end or if the air has access to the lower coil it will force the water upwardly, as is desirable. The header extends axially within and through the coils and has at the bottom a blow-off cock.



No. 714,237.

714,402. Frame Joint.—James H. Sager and Geo. D. Green, of Rochester, N. Y. November 25, 1902. Filed April 28, 1902.

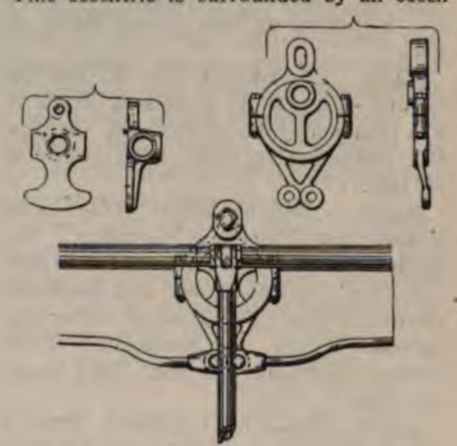
Refers to a motor bicycle frame and claims "in a frame joint, the combination with one section of the frame, of lugs; ears attached to said section and adapted to lock said lugs to said section; and means for connecting another section of said frame to said lugs."

714,492. Explosive Engine.—François Lagoutte, of Asnières, France. November 25, 1902. Filed June 26, 1900.

In an air cooled engine, to facilitate the cooling, a front or auxiliary exhaust is provided, through which the exhaust products escape to the atmosphere at the end of the expansion stroke. In this auxiliary exhaust is placed an automatic valve.

714,501. Steering Device for Automobiles or Other Vehicles.—Winthrop L. Mead, of South Orange, N. J.

To make a steering gear operated by a tiller irreversible, an eccentric disk is fastened to the lower end of the steering post. This eccentric is surrounded by an eccentric strap which forms part of a lever to which the links for the steering knuckles are connected. The lever is provided with an elongated slot through which passes a pin or bolt fastened upon the front axle, which bolt acts as a pivot.



No. 714,501.

713,194. Sparking Mechanism for Gas and Gasoline Engines.—James E. Bean, of Milwaukee, Wis. November 11, 1902. Filed October 16, 1901.

712,580. Motor Car Saddle and Handle Bar Support.—Charles P. Norgate, Orrell, England. November 4, 1902. Filed May 31, 1902.

712,583. Controlling Mechanism for Motor Vehicles.—James W. Packard and William A. Hatcher, Warren, Ohio. November 4, 1902. Filed February 12, 1902. Described in THE HORSELESS AGE of August 20, 1902.

712,733. Steel Spring Tire for Vehicles. —John A. Shearer, Schenectady, N. Y. November 4, 1902. Filed October 31, 1901.

712,805. Explosive Engine.—Whitcomb L. Judson, Chicago, Ill. November 4, 1902. Filed April 25, 1901.

712,875. Vehicle Wheel.—Sidney B. Whiteside, New York, N. Y. November 4, 1902. Filed February 8, 1902.

712,876. Vehicle Wheel.—Sidney B. Whiteside, New York, N. Y. November 4, 1902. Filed March 11, 1902.

714,083. Transmission Gearing.—Joseph L. Wolfe, of Stamford, Conn. November 18, 1902. Filed November 24, 1900.

714,148. Boiler Feed Regulator.—Omar E.

Clark and Ellsworth E. Clark, Vicksburg, Mich. November 25, 1902. Filed February 25, 1901.

714,164. Pneumatic Tire.—Wilbraham Edmund, Ealing, England. November 25, 1902. Filed January 3, 1901.

714,201. Storage Battery.—Stanislaw Laszczynski, Berlin, Germany. November 25, 1902. Filed February 23, 1901.

714,271. Vehicle Wheel.—John M. Alderfer, Sharon Center, Ohio. November 25, 1902. Filed May 9, 1902.

714,332. Flexible Metallic Tube.—Charles Rudolph, Paris, France. November 25, 1902. Filed March 1, 1902.

714,352. Combined Hot Air and Gas Engine.—Charles A. Anderson, Erick A. Erickson and John Wickstrom, Chicago, Ill. November 25, 1902. Filed March 28, 1900.

714,353. Combination Hot Air and Gas Engine.—Charles A. Anderson, Erick A. Erickson and John Wickstrom, Chicago, Ill. November 25, 1902. Filed December 18, 1901.

714,429. Metallic Spiral Hose.—Emil Witzenmann, Pforzheim, Germany. November 25, 1902. Filed September 2, 1902.

714,504. Variable Speed and Reversing Gear for Motor Cars, Tools or Other Apparatus.—Joseph E. Mennessier, Paris, France. November 25, 1902. Filed March 22, 1902.

714,528. Means for Tightening Wires in Elastic Tires.—John E. Sprague, Portage Township, Summit County, Ohio. November 25, 1902. Filed October 11, 1902.

714,614. Speed Regulating Mechanism for Motor Vehicles.—Salvatore Scognamillo and Charles H. Posner, New York, N. Y. November 25, 1902. Filed June 26, 1902.

714,670. Apparatus for Hardening the Cups and Cones of Ball Bearings.—Chas. H. Chapman, Groton, Mass. December 2, 1902. Filed March 21, 1901.

714,780. Speed Changing-Reversing Gear.—Frederick H. Cheyne, Indianapolis, Ind. December 2, 1901. Filed March 25, 1902.

714,878. Steering Mechanism for Vehicles.—James F. Duryea, Springfield, Mass. December 2, 1902. Filed May 10, 1900.

715,008. Steam-Explosive Engine.—Charles A. Braden, Butler, Pa. December 2, 1902. Filed October 19, 1898.

715,094. Automatic Pump for Pneumatic Tires.—Charles S. Langdon, Parkersburg, Ill. December 2, 1902. Filed December 26, 1901.

715,171. Roller Bearing.—Amos C. Stilson, East Bradford, Pa. December 2, 1902. Filed May 17, 1902.

715,196. Sparking Igniter for Explosive Engine.—Chauncey C. Chamberlain, Ionia, Mich. December 2, 1902. Filed December 12, 1901.

715,231. Brake.—Walter A. Crowdus, Chicago, Ill. December 2, 1902. Filed July 18, 1901.

715,302. Steering Gear for Motor Carriages.—Henry A. Schryver and Fred C. March, Warren, Ohio. December 9, 1902. Filed March 8, 1902.

715,305. Pneumatic Tire.—Edward H. Seddon, Brooklands, England. December 9, 1902. Filed April 15, 1901.

715,332. Accumulator Electrode.—Richard Alexander Katz, Berlin, Germany. December 9, 1902. Filed August 31, 1899.

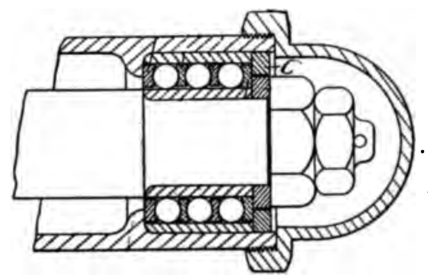
715,361. Elastic Tire for Vehicles.—Henry H. Durr, New York, N. Y. December 9, 1902. Filed July 25, 1902.

714,808. Vehicle Frame.—Hermann Lemp, of Lynn, Mass. December 2, 1902. Filed May 18, 1899.

A frame construction for an electric vehicle. A tubular battery box frame depends from the main, spring suspended, tubular vehicle frame, and distance rods are interposed between the lower part of the battery box frame and the axles, the gear being reachless. The motor is located behind the rear axle, being swiveled on the axle and supported from the spring suspended frame on the opposite side.

714,852. Ball Bearing.—Herbert Austin, of Erdington, near Birmingham, England. December 2, 1902. Filed April 23, 1902.

This invention relates to that type of ball bearings wherein a plurality of rings of balls are employed, the balls of one ring being separated from those of the adjacent ring by a washer. One of the objects of



No. 714,852.

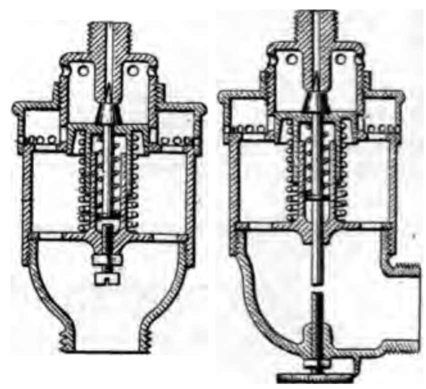
the invention is to provide against the balls falling out when the wheel is removed from the spindle shaft, which carries it and yet permit the rings of balls to take the end thrust consequent upon the movement of one of the major parts relatively to the other in a direction perpendicular to the plane of rotation. The washers between the rows of balls are made with a slightly curved surface, so that the width between the inner edges of any two adjacent washers is less than the diameter of the balls, or, in other words, the ring-like washers have their inner margins slightly thickened, so as to take under the balls and form retainers to prevent the balls from falling into the hollow of the bearing when the axle or axle arm B is withdrawn.

714,902. Means for Starting Explosion Motors.—J. W. Hinchley, of London, England. December 2, 1902. Filed June 20, 1901.

The inventor is of the opinion that the air entering through the open compression cock in starting an explosion motor unfavorably affects the mixture, and to remedy this he provides a check valve in the cock which [illegible]nts air from entering.

714,982. Generator or Mixer Valve.—Frank B. Widmayer, Michael E. Toepel and Adolph Potdevin, of New York, N. Y. December 2, 1902. Filed May 9, 1902.

Relates more particularly to that type of generator wherein the gasoline is supplied at each stroke of the main admission valve through a supplementary valve termed the "oil valve," which opens a passage



No. 714,982.

leading from the oil or gasoline supply to a chamber into which the air is drawn by suction or vacuum produced by the piston of the motor.

The mixer has two sources of air supply, one of these sources being adapted to being regulated by screwing a cap on the mixer up or down. The gasoline needle valve is operated by a piston actuated by the suction. The limit of opening of the needle valve is also adjustable.

715,398. Carbureter for Explosive Engines.—Amelie A. Longuemare, Paris, France. December 9, 1902. Filed March 20, 1902.

715,412. Storage Battery.—Leonard Paget, New York, N. Y. December 9, 1902. Filed September 8, 1899.

715,413. Storage Battery.—Leonard Paget, New York, N. Y. December 9, 1902. Filed August 28, 1901.

715,430. Detachable Pneumatic Tire.—Frank A. Seiberling, Akron, Ohio. December 9, 1902. Filed March 12, 1902.

Accidents.

While Mr. Edwards, Richmond, Va., was giving Dr. Frank W. Upshur a ride in his automobile, it collided with an electric car and Dr. Upshur was thrown over the dashboard and badly bruised.

Stanley Shimer's automobile and a trolley car collided at Bethlehem, Pa. Mr. Shimer received several bruises and the machine was badly damaged.

Mrs. Anthony Grossman, Los Angeles, Cal., was thrown out of her buggy recently by an unidentified automobile, which ran into it, and was so badly injured that her recovery is reported to be in doubt.

One of the tires of an automobile, in which J. D. Craigston, Denver, Col., was riding with J. M. MacIntosh, exploded and the machine dashed into a telegraph pole, severely injuring both.

?eport of the A. C. A. 500 le Reliability Contest.

cial report of the contest com- the Automobile Club of Amer- New York to Boston and Re- bility Contest, October 9 to 15, ıade its appearance, the advance ing been received at the club on December 16. The report is minous, covering 112 pages. It ɜd to the board of governors of A., and comprises an introduc- w general observations on the :commendations for future con- ıiled account of the performance dividual car, the causes of stops ıges, a table of averages (speed), d of calculation of averages and marks and a list of awards and .

ıtroduction the committee states ;ired to carry out the contest as ɔossible under conditions similar ı individual would meet in tour- :he country. The details of the :arefully thought out, the course ıtely measured and marked with nd arrangements for hotel ac- ions and supplies of gasoline ided. In making these arrange- experience of the contest com- last year was exceedingly help- committee regret to say that at :n, notwithstanding the fact that definite arrangements with the ıg hotels, in a number of in- nembers of their party were ercharged.

ing the carrying out of the rules, fair to state that the contestants were very careful to observe not spirit but the letter as well. The is especially gratified that in no as it necessary to discipline or any contestant in regard to the exceeding the speed limits.

ception of the contestants along vas cordial and enthusiastic. In :he towns and villages work in ɾas suspended, schools were dis- d the children and bystanders waved flags, cheering the con- they passed and showing every nterest, courtesy and good will. ırd, that enterprising company, rd Rubber Works, both going to ıing from Boston, furnished all with the run a splendid lunch, ; thoroughly enjoyed and appre- t Springfield the Knox Automo- any tendered the contestants a hich was heartily enjoyed by all pants.

return of the party to Spring- :evens Arms and Tool Company he contestants a theatre party ard entertained the company at To our hosts of these several your committee desires in this r to acknowledge its apprecia- tion of their courtesy and to tender them its cordial thanks.

"In calculating times of arrival at the Springfield control on the outward trip a detour was necessary at Windsor Locks on account of road repairs, thereby disarranging the time schedule laid down in the program. This was taken into account and slight variations from the schedule, early or late, were allowed.

"Arrived in Boston Saturday night, the Automobile Club of Massachusetts manifested their good fellowship by tendering us a smoker in their elegant rooms, which was greatly enjoyed and for which we desire to express our hearty thanks.

"The homeward journey to New York was but a repetition of the delightful weather and pleasant features of the outward trip. The return was so pleasant and uneventful of unusual or untoward incidents that the gentlemen of the press found it difficult to find matter about which to write. The cars started from each control exactly on the tick of the clock and arrived with almost the same regularity.

"By reference to the report it will be seen that the chief difficulties were on account of ignition and tire troubles. The tire question is so important a one that we suggest the advisability of holding a special tire contest, giving suitable awards to those manufacturers who shall succeed in producing the best tires for road use.

"We desire to emphasize the fact that there were a number of cars whose reliability marks were almost as great as the cars above mentioned. Under the rules of the contest the committee is permitted to take cognizance of the general behavior of the car and the amount of adjustment or repairs made in or outside the periods of the control. It was only by recourse to this provision of the rules that your committee was able to make the required decisions.

"We cheerfully state that there were other cars that measured up almost to the same high standard as that achieved by the winners.

"We desire to call attention to the fact that in the contest seventy-five cars started from the heart of the metropolis of the country, passing through thickly settled communities all the way to the heart of Boston, the fourth largest city in the Union, returning over the same road to New York, and that such was the care, consideration and skill of the contestants that no serious accident of any kind whatsoever happened to mar the enjoyment of this memorable run.

"In conclusion we beg to congratulate the board of governors on the most excellent showing made by cars of American manufacture.

"The results of the contest show that giant strides in all those qualities which go to make for endurance and reliability have been made during the brief year since your last contest. We consider this a matter for mutual congratulation and believe that the day is not far distant when the signet 'Made in America' will stand for all that is highest and best in automobile construction throughout the world."

(Signed) WINTHROP E. SCARRITT.
GEO. F. CHAMBERLIN.
JOHN A. HILL.

The record of each car contains the following items: Name of maker; name of entrant; name of observer; description (body, horse power, number of cylinders, seating capacity); weight without passengers; number of passengers carried; average miles per hour for 488 miles, exclusive of non-penalized stops; duration and cause of each stop, both penalized and non-penalized; duration and description of tire troubles; list of marks deducted for early or late arrival at controls and for penalized stops; repairs and adjustments at controls; repairs to tires at controls, and total reliability marks earned.

In our next issue we expect to reprint the records of the various contestants and conclusions drawn therefrom. Following is the method of calculation employed, as explained in the official report:

CALCULATION OF AVERAGES.

In calculating the average speeds, no speeds in excess of 14 miles per hour or below 8 miles per hour, as provided in the rules, are recognized.

Where less than 8 miles per hour is made in a control, or where the control is missed, the contestant receives no credit for that control.

The method of calculating the average speed for each control is as follows: Divide the length of the control in miles by the running time of the car in minutes after deducting time lost in non-penalized stops; multiply the quotient by 60 to obtain the average speed in miles per hour of the car for that control.

Example: New York to Norwalk, 44.5 miles. Running time, 190 minutes.

44.5 miles ÷ by 190 minutes = .234 × 60 = 14 miles per hour.

To obtain the general average in miles per hour for the whole distance from New York to Boston and return to New York, 488.4 miles (for the twelve controls), it becomes necessary, in order to obtain a true average (owing to the varying length of the different controls), to reduce each control to mile hours by multiplying the miles in the control by the average speed in miles per hour of the car previously ascertained. The mile hours for each of the twelve controls are then added and their sum is divided by the total 488.4 miles, the

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A Sample Calculation Is as Follows:

Controls.	Miles.	Running Time in Minutes.	Average Miles Per Hour.	Mile Hours.
New York-Norwalk	44.5	190	14	623
Norwalk-New Haven	34.5	148	14	483
New Haven-Hartford	42.2	198	12.78	539.3
Hartford-Springfield	26.4	113	14	369.6
Springfield-Worcester	52.0	223	14	728
Worcester-Boston	44.6	191	14	624.8
Boston-Worcester	44.6	191	14	624.8
Worcester-Springfield	52.0	223	14	728
Springfield-Hartford	26.4	113	14	369.6
Hartford-New Haven	42.2	397	X	X
New Haven-Norwalk	34.5	148	14	483
Norwalk-New York	44.5	190	14	623
Total	488.4	....	....	6196.1

X—Less than 8 miles an hour.

6196.1 mile-hours ÷ 488.4 miles = 12.68 average miles per hour for the 12 periods.

quotient being the average miles per hour for the whole distance.

CALCULATION OF RELIABILITY MARKS.

In calculating the reliability marks of each car one mark is deducted for each penalized stop of 60 seconds or any fractional part of 60 seconds. Thus:

59 seconds stop = 1 mark deducted.
1 min. 1 second stop = 2 marks deducted.

ANALYSIS OF STOPS.

An analysis of the total number of stops from all causes due to the mechanism of the car (and including tire troubles and stops for water and gasoline) of the sixty-seven cars receiving certificates, is as follows:

GASOLINE CARS.

Forty-nine cars, six of which had no stops, the remaining forty-three having stops as follows:

	Per Cent.
Ignition	26
Water circulation	11
Stalled motor	10
Tires	10
Valves	10
Accidental stops	6
Carburetor	5
Transmission gears	4
Springs	2
Gas connections	2
Out of gasoline	2
Lubrication	2
Wheel bearings	2
Chains	2
Clutch	2
Brakes	1
Broken piston	1
Crank shaft.. Muffler....... Steering gear.	2
	100

STEAM CARS.

Eighteen cars, two of which had no stops, the remaining sixteen having stops as follows:

	Per Cent.
Water and gasoline	75
Tires	9
Air pressure (all in one car)	5
Water connections	3
Lighting fires	2
Low steam	1
Water glass	1
Lubrication	2
Brakes, Chain, Gasoline connections	2
	100

CAUSES OF WITHDRAWAL.

Seven cars withdrew from the contest for the following reasons:

B-6 Foster—Broken crank shaft.
B-14 Autocar—Damaged gear shaft.
B-15 Ward Leonard—Jaw couplings between engine and speed gear broken; crank shaft bent.
C-50 Neftel—Defective water circulation; hot engine.
A-54 De Dion-Bouton—Broken steering gear.
B-69 Fredonia—Damaged transmission gear.
A-74 Buffalo—Broken connecting rod.

An Incident During the Discussion of Auto Legislation in the State of Massachusetts.

It transpired one day during a recent term of the Massachusetts Legislature that the speed bill came before a certain committee. The committee in due course of time ordered a hearing, at which all parties, for and against, were to be present, and present their respective claims. On the opposition appeared a certain dignified gentleman who fairly looked as if the auto were doomed, if he could get a chance to have his little word and present his grievance.

"Gentlemen," he began, as he arose to address the committee, "I have taken the trouble to secure a few newspaper clippings, in regard to the large and ever increasing number of automobile accidents, that are happening right before our eyes every day." With that he produced quite a large number of clippings in a large bundle, and handed the same to the clerk of the committee. The clerk took the bundle and began to sort them over, thinking no doubt that some of them would be referred to by the opposition party. The clerk suddenly stopped, and turning to the speaker he said: "Have you read any of these notices, that you have handed to the committee?" "No, sir," said the speaker. "I didn't suppose it was necessary, I sent to the paper office for them, and supposed I got what I sent for, and should judge by the size of the package I had received a description of a large number of accidents directly due to the automobile." "Well," said the clerk, "all this entire bundle contains, is simply the report of two minor accidents to automobiles, and the cases in both are accidents to the machines, not to individuals."

N. A. A. Proceedings.

The annual banquet of the association will be held at the Waldorf-Astoria, New York, on Friday evening, January 23, 1903, and the annual meeting will follow at Madison Square Garden on Saturday, January 24.

A circular letter has been issued to members in regard to the promoters of automobile exhibitions, stating that they are expected to exhibit at the two authorized shows only, viz., at Madison Square Garden, New York, and the Coliseum, Chicago.

A. C. F. Awards.

In the trials of city and suburban vehicles instituted by the A. C. F. which came to an end on November 26, the following awards were made:

Two Passenger Cabs.—Gold medal to No. 7 (De Dion-Bouton); silver gilt medal to No. 18 (Gillet-Forest); silver medal to No. 16 (Clement).

Four Passenger Omnibus.—Bronze medal to No. 12 (Huber).

Six Passenger Omnibus.—Gold medal to No. 8 (Gillet-Forest); silver medal to No. 9 (Peugeot).

Delivery Wagon of 1,000 to 1,500 Pounds Loading Capacity.—Gold medal to No. 6 (Gillet-Forest).

Delivery Wagon of 600 to 1,000 Pounds Loading Capacity.—Silver medal to No. 1 (Prunel).

Delivery Wagon With Over 1,500 Pounds Loading Capacity.—Gold medal to No. 2 (Peugeot); silver gilt medal to No. 10 (De Dion-Bouton); bronze medal to No. 5 (Vinot-Deguingaud).

Wagons With a Loading Capacity of One Ton and Over.—Gold medal to No. 4 (Peugeot); silver medal to No. 4 (Gillet-Forest); bronze medal to No. 14 (De Dion-Bouton).

The trials lasted six days and the weather was bad for the whole period. There were eighteen contestants in all

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The Reliability Contest Report.

The voluminousness of the report of the New York-Boston and Return Reliability Contest is conclusive proof of improvement in the regulations of this year's contest as compared with those of last year. Last year the report contained comparatively little information about the actual performance of the machines—only the average speed maintained in each section—but in this year's report may be found the complete record of every car, the cause and duration of every stop, penalized or non-penalized, as well as a record of repairs and adjustments made at every control. The list of non-penalized stops, with the exception of stops caused by tire troubles, is, of course, of no particular interest. The penalized stops and repairs and adjustments made at controls are to be found in another part of this issue. The tire troubles en route and the replacements and repairs at controls we have arranged in tabular form, in order to facilitate comparison. To the items given in the report we have added another deduced factor, the weight of vehicle and passengers per inch width of tires, the weight of each passenger having been assumed to be 150 pounds in this calculation. It is, of course, well understood that for a tire of given size the strain is the greater the greater the weight supported, and the column giving the weight supported per inch of width of tire will permit some allowance for differences in the degree of loading of the different tires. It will be found, for instance, that one vehicle which had considerable trouble with tires was a 3,000 pound machine, having only 3½ inch tires, which were therefore very heavily loaded.

Some information may also be obtained from this table regarding average practice in determining the size of tires.

In connection with the reports of tire troubles it will be noted that different observers construed their duties quite differently. Some, for instance, state the cause of certain stops en route to have been due to tire troubles, without further specifying the nature of these troubles, while others went to what may be regarded as the other extreme, in noting every time the tires were pumped up at controls. We also note an apparent absence of uniformity in the data on tires furnished by the entrants, the weight and price being generally given for a single tire only, but in some instances the figures evidently referring to a set of four.

The table of causes of stops in percentages, reprinted from the official report in our last issue, is quite instructive. In the gasoline class the greatest number of stops due to any one cause were those due to ignition troubles. This was to have been expected. However, since a large proportion of these troubles were nothing more serious than the fouling of spark plugs, if the time loss occasioned by various causes were summarized, ignition troubles would stand out much less prominently, we believe, than they do.

It must be regarded as surprising—though it is entirely in accord with the results of the recent British Reliability Trials—that the source of trouble next in importance is the water circulating system. With all that has been said about the unreliability of tires, the water circulating system was responsible for more stops than these much abused parts! The only plausible reason for this seems to be that the water circulating system is more or less neglected by most manufacturers. If all tanks were made with brazed joints; pipe connections the same, of seamless tubing, with union detachable connections only, and these as small in number as possible and locked against jarring loose, and if the circulating pumps were positively driven and means provided for conveniently ascertaining the amount of water remaining at any time, troubles due to the circulating system should be almost unknown.

The next cause is stalling of the motor, which, it is to be presumed, includes the stops on hills that proved too steep for some of the machines. The next cause, tires, is followed by "valves," which latter were responsible for the same number of stops as the former. Then follow accidental stops and stops due to the carburetor. The remaining causes led to only few stops each, but among them were the

more serious breakdowns and extended delays. It will be observed that, as far as the report goes, no stops were caused by "dirt or water in the gasoline," which in the earlier contests were the alleged causes of most short stops.

In the steam carriage class 75 per cent. of all the stops were for renewing supplies en route. These stops may be regarded as of a different nature from the rest, as they come at regular intervals and not unexpectedly, as do the others. In this class tire troubles predominated in number, being followed by troubles arising from the fuel air pressure system. However, as all the stops due to this cause were in one car, it can hardly be concluded that the air pressure system is generally a source of much bother in steam carriages.

Names of Vehicles in "Lessons of the Road."

Quite a number of readers, apparently prospective purchasers, have recently requested that we give the names of vehicles referred to in articles under "Lessons of the Road" and in letters of experience. We have already stated in an editorial some months ago that this would defeat our object and deprive these departments of much of their value.

Letters of experience, with the names of the machines given, are published by nearly all the manufacturers, and may be had by applying for testimonial letters. What we mean to say is that if we undertook to publish accounts of experience, giving the names of the machines involved, we would soon be flooded with contributions that could properly be classed only as testimonial letters. This is not idle fancy, but the result of extended experience. We do not believe that testimonial letters are what the majority of our readers want. At any rate we shall not undertake the publication of such matter. Until further evidence is produced we shall continue in our belief that we can do more good by withholding the names and preserving the bona fide character of these articles. We have ample evidence that such articles published without the names of machines are much appreciated by the majority of our readers. If some new convert to the movement, owing to his unfamiliarity with the subject, cannot profit by them immediately—i. e., cannot learn directly what he wants to know, viz., what is the best machine on the market for his purpose—it is not a fault of the paper, for, as we have stated, such service belongs properly in the province of the consulting engineer. "There is no royal road to knowledge" in automobiling as in other things.

Reduction of A. A. A. Dues.

Apparently the cause for the slow accession to the membership of the American Automobile Association has at last been discovered; for it is to be presumed that the reduction in membership fees, referred to elsewhere in this issue, is the result of the objection of outstanding clubs to the amount of the dues as originally fixed. This action of the association is certainly to be commended, for the first essential of success for an organization of this kind is that it be representative and include as far as possible all clubs in the country. The expenses need not necessarily be very large, and with the present rapid growth of the movement and of the number and membership of clubs an enormous "individual" membership, which determines the income, can be attained in a short time if a correct policy is pursued. It is natural that automobilists in country districts, especially in parts where as yet no restrictive legislation has been enacted, are not particularly enthusiastic about a national organization, and the local clubs usually pursue social purposes only. But as the movement extends abuses on the one hand and prejudice on the other are likely to result in more and more friction that might prove harmful to the movement if its interests were not looked after by a strong and representative body. The necessity for an organization of the character of the A. A. A. is therefore growing from day to day, and since the association has already done much to benefit the automobiling public and has now made the terms of admission easier it is to be hoped that at least all the more important clubs will soon join the organization.

The Action of Flash Generators in Use on a Motor Car.

By J. S. V. Bickford.

The flash generator is not altogether ill adapted to stationary use if a governor be used, or for any purpose where somewhat high consumption of fuel is not objected to. The action on a car, however, is not the same.

Suppose the burner has been lighted and the generator coils are hot; the pressure gauge, of course, shows no pressure and the hand pump has to be used. After the first few strokes the pressure gauge moves, the movement depending on the way the generator is coupled up. With a downward flow the rise will be more or less steady; but with an upward flow, and especially without a feed heater, the rise will be of the nature of a jump, indicating a sort of explosion. Steam is now turned on to the engine and the pressure instantly falls, the fall being probably to zero in the case of an upward flow generator. More hand pumping, accompanied by more gauge jumping, will get the car under way in a few moments. The arrangement, supposing none of the minor fittings to give way, works well and steadily as long as the demand for steam is constant; if, however, any sudden demand for steam is made the pressure falls at once, and as a rule more hand pumping is required. To my mind this use of the hand pump after starting is very much against the generator.

THE FEEDING ARRANGEMENTS.

As has been stated, the feed of the flash generator is always controlled in some way by the pressure and never by the amount of water in the coils, and there is in existence a considerable number of methods of controlling the feed. I suppose everyone who has ever experimented with these generators has first tried a constantly running pump with a relief valve on the delivery, returning the water to the tank. There are, however, almost fatal objections to this plan. They are small objections, but for all that serious. The first is that no matter how good the relief valve is it will leak almost at once, and as a check valve is not used between the relief valve and the generator, this leakage lets the water out of the boiler and necessitates a very large pump. This will at once be understood if it be remembered that the engines will be running slowly up hill when the demand for steam is most heavy, and at that time the feed pump has to supply water to the boiler most rapidly. I have often noticed, with a flash boiler plant, that when the engine was running slowly the pump could not supply the leakage through the relief valve, when by actual measurement of the overflow from the relief valve the pump was capable of supplying three times what the boiler could possibly turn into steam, and this with the engine running idle. It is, of course, absolutely necessary to place a filter in the pipe leading to the overflow valve, or it will stick at once and all the water will run out of the boiler.

One possible arrangement is to use a safety valve on the generator and place a check valve in the delivery beyond the relief valve. There are two points to note in this connection. The first is that it will be necessary to loosen the spring of the relief valve, as the inertia of the water in the pipes will jerk the check valve open and let water into the boiler, even when the actual setting of the relief valve is not 50 per cent. of the boiler pressure for the

urther, this arrangement enoreases the fluctuations of pres- not by any means uncommon : conditions to see the pres- g between 75 and 300 pounds inch in about thirty seconds this continually. Now, as e on which one can count for e for hill climbing is only the sure to which the gauge falls at t, it is easily seen that there are tions to this arrangement.

point to note is that with a on a flash generator the steam uch the spring or it will draw out of it in a few moments.

ination of the cars at present et shows that this difficulty has ntered by all builders of this erator, and has been met by dients. The White steam car, ed up well in the recent club a diaphragm valve in which the ure acts on a diaphragm, which trols the suction valve of the ne pump overflow. The same it has been patented in Eng- Ir. Clarkson, and has, I am een used and discarded by Serance.

r builder now uses a duplicate ng two different size plungers, ich forces oil and the other proportions being so arranged delivered shall always be able : all the water. As far as I is no relief arrangement, and e may rise to 1,500 pounds or e oil pressure goes up to about sion.

at has been said it will be un- nat a large pump is essential n boiler, and if this pump is at delivering against full boiler will take a great deal of power The reason for this excessive np is that the amount of water r varies from second to second. ing down a hill the boiler will empty itself and get nearly red ugh (where no method of con- : fire is used), and as soon as es the next hill the generator be practically half filled before tor will supply enough steam. he car has to be slowed for 100 to an undignified crawl, or hand as to be resorted to. I am of that the best way of overcom- to use two pumps, both run off, ck axle, and one of them cap- trol from the seat. Then, when essary to make any sudden de- steam, the second pump would into action, and it would rapidly oils.

another point in connection with a relief valve on the delivery ump with this type of generator not yet been alluded to. If the be set for, say, 250 pounds per n it will be found that as long as the engine is running slowly the pressure in the generator will keep up all right to 250 pounds per square inch, but if the engine be quickened up the inertia of the water will jerk the relief valve open at much below the pressure for which it is set, and I have often noticed that with a generator set as above, for 250 pounds at, say, fifty revolutions per minute of the engine, the pressure will fall to 50 pounds per square inch at 600 revolutions. This is in no way connected with the momentary fall of pressure when the engine is quickened up; the pressure falls to the same point for the same speed each time and does not rise above it while that speed is maintained.

The use of an air vessel on the pump delivery is not of much use, as it will be seen that at the pressure in use there will be very little air in it. I have tried the following expedient with some success. To the pump delivery in the place of the water vessel I attached a branch pipe, and to this a small brass cylinder, in which worked a cup leather controlled by a powerful spring. The capacity of the cylinder was about equal to the capacity of the pump. Of course, this cup leather worked in and out with the strokes of the pump, and this tended to stop the jumping of the relief valve.

EXPERIMENT ON ENCRUSTATION.

As has already been said, there is no deposit of scale in a flash generator. A writer in the *English Mechanic* some time since detailed a very pretty and effective experiment. Take a silver spoon, fill it with hard water and evaporate the water over an alcohol flame. The spoon will be encrusted with lime. Now take the same spoon, clean it, make it red hot and drop some hard water into it. The water will assume the spheroidal form, running about the bowl of the spoon and finally disappearing. On examination it will be found that there is no deposit on the metal, but only a little loose dust in the spoon, which can be easily blown away. This experiment shows the difference between the action of the boiler and the flash generator. In the former case all scale and salts in the water are deposited on the plate in the form of a crust, while in the latter they are all carried through in the steam as dust, and means must be provided for removing them before the steam enters the engine.

STEAM FILTERS.

As already stated, the first arrangement I adopted was a steam drum into which the steam passed on leaving the coils. The ends of this were brazed in, and it was soon found that this method of attachment would not do, as the brazing melted almost at once and started a bad leak. For this reason in the second boiler built a special arrangement of the steam pipe was designed to extract dirt as far as possible before the steam reached the engine. The steam left the boiler in a ⅜-inch steel tube, entered the top of a ¾-inch steam pipe placed vertically, and passed down to about the middle of the length of the same. From the side of this ¾-inch pipe, near the top, the main steam pipe for the engines left. By this means any dust in the steam was to some extent collected in the ¾-inch pipe and blown out through a pet cock at the bottom. It was, however, doubted whether this would be really efficient, and it was considered that it would be much better if the impurities could be kept out of the coils altogether.

Now, hardness in water consists either of what is known as temporary hardness or of permanent hardness. The former is due to calcium carbonate dissolved in carbonic acid, which in turn is due to the solution of carbonic acid gas in water, while the latter is due to the solution of sulphate of calcium or gypsum. Temporary hardness is removed by boiling; permanent hardness is not, and can only be removed by some water softener, such as carbonate of soda. I consider that it is not possible on a motor car to do more than remove the temporary hardness. The following experiment was conducted to decide how far heating the feed water before it reached the pump would remove temporary hardness, and though the results are not conclusive, still they are interesting. It had been my intention to pass the feed water through a ball valve tank before it reached the feed pump and provide arrangements for removing any impurities thrown down, and it was hoped that these would contain practically all the chalk in the water. This hope was founded on the fact that almost all the chalk in feed water is deposited on the first few feet of the feed heater where one is employed.

To begin with, a quantity of hard water was made, the water of this district all being quite soft. This was done by bubbling carbonic acid gas through lime water till the cloudiness first formed was removed. The effect is due to the formation, in the first place, of calcium carbonate and the subsequent solution of the same in the excess of carbonic acid. This hard water was then allowed to drip at about the rate of 40 pounds per hour through a cubical cracker tin through which saturated steam was passing at atmospheric pressure. The hard water was first filtered to remove any solid particles in it, and on entering the tin box it fell on a sheet of coarse blanket. The temperature of the water leaving the tin was about 150° Fahr., a rise of about 90° Fahr., and the quantity entering was 40 pounds, and leaving, 44 pounds, showing a gain of 10 per cent. due to condensation. Subsequent experiments led me to think that the amount of steam condensed would be slightly more than this in practice. Unfortunately, a friend to whom the samples of water treated were given for analysis lost them, and the experiment has never been repeated, but I am inclined to think that the results are good, as the blanket, which was a dark brown one, was

quite white where the stream of incoming water struck it.

STEAM LEAKS.

Perhaps this will be as good a place as any to give to experimenters a word of caution in an important matter. What would the average reader suppose would be the amount of water unaccounted for if all the exhaust of a motor car steam engine was condensed? Two or 3 pounds per hour, perhaps? This is what I expected, but I find I was wrong. The lowest figure I have ever reached is about 8 pounds per hour on a condensation of about 50 pounds, and the highest result is about 40 pounds on 60 pounds. Superheated steam is most insidious stuff and you cannot see it at all, so that it is necessary to be most careful of all glands. A leak which appears quite insignificant will run away with a couple of gallons of water per hour.

MAXIMUM EVAPORATION OF FLASH BOILERS PER SQUARE FOOT OF HEATING SURFACE.

I have at various times seen some fairly staggering statements as to the efficiency of this type of generator. The mistakes are, I believe, due to the difficulty of insuring that the generator shall not prime. When, as already stated, the condenser is attached to the end of the coils, it is not possible to see if the generator is delivering water or steam, and if it only delivers water for a few minutes during the hour the results will be quite at sea.

In an ordinary boiler the usual allowance is about 1 square foot of heating surface to each 5 pounds of water to be evaporated per hour, and this is a good rule for any generator if economy is to be sought after. At the same time torpedo boilers occasionally run up to 12 pounds per square foot, and this is the highest figure I have ever noticed with a flash generator, and then only under conditions of prohibitive wastefulness. To get this result, about 2 square feet of heating surface in the form of a 1 inch bore tube was placed over a burner capable of burning about 1½ gallons per hour and the burner started at full power. The result was a steam output of about 24 pounds per hour. That this was the utmost limit of the capacity was proved by allowing the oil pressure to the burner to fall for a minute, when the boiler at once began to prime. In my opinion a safe rule for this generator is not to force the output beyond 7 pounds per square foot under any circumstances, and this is also the limit set by Messrs. Simpson and Bodman in their paper read some years ago before the Liverpool Self Propelled Traffic Association.

For the benefit of anyone who may experiment in this direction it may be useful to state the capacity of certain size nozzles to pass superheated steam. Of course, the capacity will depend on the temperature of the steam, and the results given must only be taken as approximate. The nozzles consisted of holes bored in a ⅛-inch plate. This form is, of course, a bad one for passing steam, the best shape hole being the vena contracta; a hole in a shin plate will not pass much more than half that which passes through a vena contracta of the same size.

Two sizes of hole were tried—one .098 of an inch in diameter, which passed 12 pounds per hour at 40 pounds per square inch, and another ⅛ inch in diameter, which passed 33 pounds at 50 pounds per square inch.

FIRE CONTROL.

The only point in connection with these boilers which remains to be considered is the control of the fire. A multitude of methods have been tried for this, and some people, notably the Miesse car builders, avoid the difficulty by not controlling it at all. In that case, of course, the consumption of oil is heavy and the machinery inefficient—at least, that is what one would expect, though I have never had any experience with the Miesse and have never heard what the actual consumption is. There is, however, one advantage in this arrangement, and that is that it allows of a perfectly silent burner being used. Large tube Bunsen burners, as I pointed out in THE HORSELESS AGE some time since, are silent, but likely to light back if turned down; they are, however, reliable if kept running at full power or only turned down slightly.

Serpollet, as stated above, uses a duplex pump with the barrels so proportioned that the oil passing through the one will always vaporize the water passing through the other. I do not know how this arrangement works, but I am rather inclined to condemn the complication necessary. The White car, as most of your readers know, controls its oil supply by a thermostatic arrangement in the lower coils which is said to work well. There is still another arrangement, which is highly ingenious. It is brought out by the Albany Company, of London. It consists—I speak from memory only—of a pump, the plunger of which is worked by a beam turning about a fulcrum, which fulcrum is attached to the end of a rod passing through a small cavity in the steam pipe filled with soft metal. The action is that so long as the white metal is solid the beam works the pump, but as soon as the white metal melts, which it does at about 500° or 600° Fahr., the fulcrum moves instead of the plunger, and the pump ceases to act. In my own opinion the best arrangement by far would be to place a small chamber in the steam pipe filled with chemically dried air, communicating with a diaphragm valve controlling the fire. I have used this arrangement (without the diaphragm valve, but with a pressure gauge in its place) to read the temperature of the steam, and have always found it to work perfectly. One caution should be given, and that is that the chamber containing the air must be of copper. For some reason which is not clear to me, if the chamber is made of iron it generates a pressure spontaneously, so that the chamber has to be unsealed occasionally to let out the excess pressure.

There is still one more method of feed control to be considered. It is possible to supply the boiler with water from an independent steam pump supplied with steam through a valve controlled by the water pressure in the pump delivery. By this method, as will be seen, the action is to maintain a constant pressure in the feed pipe, and the boiler or generator takes what it wants exactly as it would were it connected to the town mains. The only objection to this method is that it is complicated. The machinery of a motor car is complicated enough without gratuitously adding to the apparatus to be carried, and these small steam pumps are very kittle cattle to deal with, by no means certain in their action, and as the action of the whole of the machinery depends from instant to instant on the maintenance of the feed supply at full pressure, the arrangement is hardly to be recommended.

How a Defective Machine Was Dealt With.

By C. WILL TRAVIS.

Whether your ideal automobile be steam, gasoline or electric, as an intending purchaser you should inquire of the users of the machine you are considering. Their experience, though probably rose tinted, will be of far greater assistance to you in the selection of a car for your needs than any knowledge gained in the perusal of catalogues and circulars, or even a ride with the agent.

There are many makes to choose from, some really good, others only fair, and some exceedingly poor ones. To escape the latter there is only one safeguard, which is knowledge, and it awaits you for the asking. The experienced, disinterested users' knowledge of automobiles will lessen your burdens, and will hasten the day of the perfect machine; and with no demand for the "tin" ones, they will cease to exist.

I received a telephone call one noon requesting that I come to M——, a village 30 odd miles distant, "on the banks of the Ohio"; and I was glad to embrace the opportunity to get away from the usual routine duties.

The party at the other end of the line had purchased a steamer, because, as he expressed it, "I thought I knew what steam was." The machine had arrived and he had made several unsuccessful attempts to fire up, and wished to have some instructions relative to its operation and care.

Placing a few tools, some material and a blow torch in a grip, I started the engine of my old reliable and drove over, but, owing to the road condition, arrived too late to do more than take a good look at the machine that evening.

We were called early the next morning

ceeded to get things in shape for a fore the neighbors came in. The structions accompanying the ma- ere those written on tags attached various parts, which read sub- y as follows: "Fill the gasoline der the footboard"; "Only half fill k in front of the dash"; "Never p the air pressure on the gasoline ed 30 pounds"; "Use alcohol in to start the pilot light"; "Close ve to pump water into the boiler,"

locked up one side of the rear axle wheel was clear of the ground. ie pilot light was started with 25 air pressure, restarted, and re- again, and finally the effort suc- and we soon had a good head of and the engine going. But the would not stop when the throttle osed. Investigation showed that ttle connection with the lever was line with the valve stem, and the would not seat itself, no matter essure was used on the lever.

ire was turned out and the holes ront board of the seat support, to ie throttle lever was attached, had otted nearly a half inch before the ould move in line with the valve.

ire was again started. The water oiler was low and the action of the d pump was found to be ineffect- was found that a nipple between np and check was thread cut the wall of the pipe, and although with tape and neatly tied with a the factory, the pressure was too or it to stand. After removing all of the piping and the hand a new nipple was inserted and ng put in shape for the next trial, roduced the desired result, so far pump was concerned.

miles' travel on the road, and it d that it required almost incessant ie air pump to get us home. Upon rn to the barn the gasoline tanks iptied and removed. A soldered nection on the front tank proved e cause of this trouble, and in re- it I found the reason for the in- s, "Never pump up the air pres- the gasoline to exceed 30 pounds." ks were 6 inches in diameter, 22 ng, and made of 27 gauge brass, and soldered seam and ends, no id no internal bracing whatever. ront tank was securely held in two bands encircling it, but the only rested on two strap iron in the body, with no other pro- ian the pipe connections to hold in place. Evidently this weak tion of the tank support was the our air leak. It was easily reme- vever, by placing strap iron bands top of the tank to firmly hold it

ottle of alcohol had been placed ool box with the wrenches, etc., where it was sure to get broken; and so we found it, cracked and empty, when wanted, about 4 miles from home. A back draft had swooped down the flue and taken fire and pilot light out the back door, as it were, on a lark. A little gasoline from the tank drain soon had the pilot at work and the fire lit, and we were on our way home.

Upon our return the pilot was removed. It was a common form of paint burner. A slot was sawed nearly half way through the generator tube, just in front of the needle valve opening. In the slot a piece of sheet iron was inserted. In the end of this a hole had been punched to receive a small piece of wire, bent U shape to admit of its removal at any time. When the sheet iron was pushed in as far as it would go the gasoline would strike against it and drop into the cup, instead of going through onto the top of the fire box, and when withdrawn as far as the wire would permit and the torch lit the flame would pass into the space between the fire box and boiler and come in contact with the generator pipe. Thus the alcohol bottle was discarded.

We made a further inspection before making another trip, and we found that the chain had worn the wire screen cloth at the bottom of the fire box entirely away in the line of chain travel and would cut through the fire box itself in time. We removed the fire box and found that we would be able to raise it five-eighths of an inch, which, however, would entail many changes of the pipe fittings and connections, owing to the cutting down of the sheet metal bands that surrounded the fire box to form its support. It was finally accomplished, and when all was complete it not only looked right but was so; another serious defect of construction had thus been eradicated, and we were ready for the next problem, which brought us back to the gasoline tanks.

In making preparations for the next trial I thought it best to test the tanks, and with the owner's consent I pumped up the air pressure, not intending to go beyond 75 pounds. The gauge showed 43 pounds when the front tank let go.

It required two days' time to replace the tanks with others made of 20 gauge copper, with riveted seam and ends, and with two partition reinforcements in each, and all pipe connections brazed on—not things of beauty, with flush ends like the former ones, but as strong from the standpoint of the boiler maker's art as our limited resources of material and tools would allow. A test of 200 pounds was sufficient to prove them amply strong for their purpose, and they were put in place with a feeling of satisfaction and safety from further annoyance from that source.

The next trip proved an enjoyable one and almost devoid of incident. A little attention had to be given to the pump, it having to be repacked on the way home. At the same time the discovery was made that the automatic fire regulator would not respond before the safety valve began to act. This valve was set at 200 pounds, and the fire regulator even refused to respond when the safety was held until the gauge showed nearly 260 pounds, beyond which we did not care to venture at that time. This was all changed, however, upon our return, and the pop valve and regulator were both set more to our liking.

The points of defect that I have enumerated are only the more prominent ones, in this particular case a machine just from the factory. There were other minor defects, such as a defective and inadequate muffler, and neglect to replace with wire the hemp cord with which its outlet pipe was tied for support across the top of the boiler. Then there was a built up brass tube water column of insufficient thickness to be properly threaded to receive its connections, gauge cocks, etc.

It had taken more than a week's time to place this machine in an operating condition, in which it should have left the factory. But even after all this additional time and expense had been spent on it, it was destined to remain in the "tin" class, neither a credit to its makers nor the purchaser, which latter "thought he knew what steam was," while it was evident "all steamers looked alike to him."

LESSONS OF THE ∴ ROAD ∴

From Massachusetts to Washington, D. C., in a Steam Carriage.

By A. H. P.

For several months my wife and I had been planning an automobile tour for our summer vacation. Our wildest flights of fancy had fixed New York as a terminal, with the hope that, if the gods favored us, Philadelphia might be included in the trip. Neither of us had even thought of a further wandering from home, until a few days before the start, when the chance remark of a skeptical friend that, in case we got stuck, we could ship the "bubble" home on the Philadelphia-Boston boat and have a most enjoyable sail as well, opened up a possibility hitherto undreamed of. Why not continue down the coast if all went well? Baltimore and Washington were most alluring, and the trip home on the Baltimore boat ought to give a fitting close to a land tour and a rest which perchance might be needed by all of us—the "bubble" included.

Without deciding what our itinerary should be, we finally made our start from home about 10 o'clock on May 31, a beautiful spring morning. We carried our baggage in the front box and in a generous hamper behind, and the children packed in wherever there seemed a vacant space. The road to Worcester was as familiar to us

as our own town, and the miles dropped behind without event until the noon hour found us at grandmother's, where our two children were to stay until our return home.

DESCRIPTION OF THE VEHICLE.

The wait for dinner gives an opportunity to examine the carriage, which ought to be of interest. It was a two year old, just entering the third season. Time, however, had worked many changes in it. The former owner who looked it over in Springfield didn't know it. The carriage knew him, however, for no sooner had the two met than it at once clamored for repairs, a trait which I am sure awakened the slumbering memory of Jager and tapped wells of deep emotion. The wheels are new rimmed and heavily spoked. The wheel base is 70 inches instead of a paltry 56. The tread is still narrow. Side steering in place of the old direct tiller makes driving less a task and more a pleasure. The boiler is the same, none the worse for two slight scorchings. The engine is the same, except for new small parts in some places, and for plain bearings on the crank pins and main journals. The sprockets and new spur gear compensator are heavy, as is the chain, which is a plain block three-eighth inch Baldwin. An auxiliary water pump and feed water heater go without saying, as do the new cylinder oiler and stationary air pump which I located in the front box. The body was changed by removing the bracket and dasher and piecing out by splicing on a straight sill a distance of about 3 feet, erecting thereon a box somewhat after the shape of the motor bonnets on the gasoline cars. An ejector completes the changes and additions, except for a new pilot light and burner.

STARTING AGAIN.

After our dinner and the carriage's deep draught from my father-in-law's gasoline tank we started again, hoping to reach Springfield before night, as it is a matter of only about 55 or 60 miles, with good roads on the whole. But a heavy head wind impeded us, and led to our first disaster, it being so strong as to prevent all noises of the carriage reaching our ears. The steam pressure was remaining suspiciously low, and finally I stopped at the foot of Leicester Hill to find my burner back firing and beautifully hot. A short wait cooled it, and again lighting up we slowly climbed the very steep grade leading to Leicester town. And what a charming spot it was on top of the hill—the neat homes, the well kept lawns and, on the right, the academy buildings, which were of special interest to me as the scene of many a schoolboy prank my father had related to me in my childhood. And the air surely was a bit more crisp and invigorating. Speeding through Spencer and the Brookfields, stopping only for water and an occasional direction, we were soon in the Warrens. From there to Palmer is the only really bad piece of road we found that day, and to complicate matters my burner now began to pop and back fire in a most irritating fashion. I suppose it was a result of the heating it got at Leicester; but—strange coincidence—it became more pronounced just after meeting a young man trying to drive a spirited horse and keep a tight embrace about an equally spirited girl, if one could judge by appearances. The horse wasn't used to autos and didn't want to become so. A sudden shy past our machine, now standing quietly, resulted in a narrow escape from going over an embankment and depositing the fellow's hat in the road. We drove on out of range of the maid's reproachful looks, and as we glided around a curve, glancing back we saw the hat recovered and the embrace resumed. It made a really charming picture on that lovely wooded road, the steep hills on either side and the rushing river between. Palmer was finally reached, and, taking on a couple of gallons of gasoline and a supply of water, we drove over improving roads and reached an uncle's home in Springfield at about 8 o'clock.

A NEW BURNER.

When the burner was looked over at Automobile Headquarters in Springfield it was found badly burned, and as there seemed little chance of its outlasting the trip, even if repaired, a new one was purchased and adjusted. This adjusting is so easy if the piping is standard. Mine isn't standard, and as a consequence I assisted all day Sunday, most of the time sitting in a pool of oil and water and in an atmosphere so sulphurous from the "mechanicien's" language and my own as to make me see to it that there were no gasoline leaks about. Late Sunday afternoon things were right again, and there was just daylight enough left to take a short run and to form a slight conception of what a uniquely beautiful city Springfield really is.

A BRAKE BREAKS.

Monday, June 2, dawned another perfect day. We got a fairly early start, but before going 2 miles we found that the feed to the pilot light was leaking, doubtless from its rough handling on Sunday. We stopped at a repair station and had a cut-off valve put in, which ought to have been there to begin with. So our final start was at 10:30. Out over the long bridge spanning the Connecticut River and over good roads the machine slipped along. Save for the fact that the brake rod was receiving severe punishment from the new burner case, which was deeper than the old and touched the rod, everything seemed shipshape. When within about 2 miles of Westfield another steamer came scooting along, but leaving a trail of smoke behind. I grinned at it, I confess, although I guessed it was merely a clogged burner. That grin settled it, for scarcely a rod beyond where that machine stopped for slight adjustment, snap went my brake, and I found myself braking nothing at all. I backed into the shade near my companion in misery and removed the fragments. He was able to direct me to a good machine shop in Westfield where repairs could be made; in fact, he was senior member of the firm. A chain connection on the brake was effected, gasoline taken in, and, on the advice of the machinist who had repaired my carriage, a 5 gallon gasoline can, filled, was added to our equipment. I was grateful enough for this advice, for I doubt if I could have found gasoline short of

DOING THE SHAKER VILLAGE, NEAR PITTSFIELD.

ENTRANCE TO FAIRMOUNT PARK, PHILADELPHIA.

At 2:30, after a light lunch, we o leave the crowded town, for it day and everyone for miles ; taking in the show.

/e entered Huntington, 20 miles e water level kept falling, and ›n showed that the feed water leaking, the coil undoubtedly :cident which had happened to So, while my wife spread the nd reclined in the shade, I cut ter and piped direct to the boil- ıing already cut, as I had fore- ›ssibility of this accident occur- were ready to start again in y-five minutes.

A STEEP HILL.

untington our real work began, already getting late in the after- e hills grew steeper and the gher, except for one or two of State road. "God bless the ealth of Massachusetts!" we tly exclaimed in going over them. ıcadam had to be left at a point ›ad, rough and unkempt, stuck air. I use "stuck up" advisedly. l to accept it as the way until as- reassured by a resident that it, ıe State road, was right. So, unds pressure, we made a brave s wall. When part way up, and ı steadily dropping, my wife lf apologetic remark about how would enjoy the exercise of the remainder of the hill. I ac- apology, so to speak, and she L. I hate to confess it, but so almost at the top, and, walking car, the summit was soon passed re off. Then it was down hill, p again, higher still, and so on wn, with only one or two walks ›est inclines, until we were over and fully appreciated the differ- ›oo and more feet in level be- ngfield and Washington, a little ere we again got a glimpse of road, which seemed like an old

s overtook us, and with it thun- ıin. Directions by the natives ontradictory for some few miles I don't know now whether we ıest way or not. If it was the ık God I did not find the worst. the course cleared again, and, good Solar lantern throwing a m of light 500 and more feet 'eling was almost as easy as by got along uneventfully, and, after necessitated by an unfinished , arrived in Pittsfield at about . Just before reaching the town n the carriage tank gave out. had a store of 5 gallons in the nd it was a matter of only a few › refill. A night lunch cart : only place of refreshment open. : nearest, at all events, and we hungry, as we had not eaten ı and the road had been a hard one. At the cart we met a man employed in a storage station, where we put up for the night. The New American gave us the accommodations of a first class hotel.

ON FINE STATE ROAD.

In the morning we cleaned up the machine, filled the tanks and made a call on relatives with whom we had hoped to remain over night before our late arrival made visiting unseemly. Soon after 10 we were on our way toward Albany. A fine piece of State road stretches away for miles, the latter part of which is a very uniform but fairly severe up grade. It was here, for one of the few times on the entire trip, that I could put my feet on the box, stretch out and let the carriage practically run itself. The stanch little engine puffed away steadily and we kept up a moderate pace without apparent effort. A look behind showed the Berkshire Hills, heavily wooded, on the whole sparsely populated and little cultivated. The road curved gently, the grade ceased, and as the lightened engine speeded up we swept into a perfect view as unexpected as it was entrancing. The village of Lebanon, with its quaint houses and beautiful grass plots, lay literally at our feet. The ploughed land made with the fields of grain a checkerboard, and away for miles to the west rolled the gently undulating hills, in marked contrast with the rugged ones behind. A sharp coast, with brake on and reverse lever thrown over, fairly dropped us into the valley. A little tavern proclaimed that we were in York State, for in big gilt letters across the whole front of the house was a sign board advertising ——— Brewery beer, and incidentally and in small letters announcing the name and owner of the house. But as the beer really was good my shocked New England conscience dropped her upraised hands and again slumbered.

We lunched by a little brook, and it was then I appreciated my wife's thoughtfulness in adding a chafing dish to our kit. Egg sandwiches with sparkling spring water (Oh, how good they were!) satisfied appetites keen from our morning's ride. Early in the afternoon we barely escaped a severe shower, which divided and passed, a half on either side, merely favoring us with a few drops. We had sought shelter in a hospitable farm house just beyond which was the district school, where a "school house party," as it was called, was being held.

Fathers and mothers, uncles and aunts were eating lunch with the children. As we passed there was a scurry to hold the spirited York State horses, in spite of which we were given a cordial invitation to accept their hospitality. We felt obliged to refuse, as we were anxious to reach Albany before daylight failed. Two or 3 miles beyond a jacket was missed. So back we went, and finally found it in possession of a farmer's wife, who had picked it up. Over fair country roads, but severe hills, we spinned along, soon reaching East Greenbush, where the New York-Albany post road was picked up. From there to Albany was only a few miles, and about 4 o'clock we rolled onto the toll bridge which crosses the Hudson. A friendly bicyclist acted as guide and piloted us over the better of most disgraceful streets into Albany and to the State House. To visit this building is, of course, worth almost any effort, even the passing to and fro over the worst paved streets it has been my misfortune to see. The approach from Rensselaer is beyond description. Here in Albany we again attended to the tanks, and started out, hoping to get a few miles down in the run to Poughkeepsie. But a second heavy shower drove us to shelter, which we found in a little country hotel in East Greenbush.

All that night it rained, but by daylight the sky was again clear. It was then we made our first acquaintance with deep clay mud. Every revolution of the wheels meant steam and strain. The best we could do was about 5 miles an hour, until almost noon, when fortune favored us with better roads and where Old Sol had been rapidly making bricks of the clay mud. We stopped for a little rest and, unsuspectingly enough, I

TRIED THE SPOKES

in my drivers. Scarcely one in both wheels but was loose. So, willy-nilly, I sat in the shade of a tree and with small monkey and Stilson wrenches tightened up sixty or seventy spokes. This feat accomplished, our troubles were over, and we were again on our way rejoicing. The Catskills gradually appeared in the distance beyond the other shore. As they approached nearer and nearer new beauties unfolded, and for many a mile they received our chief attention. Hudson was reached about the middle of the afternoon, when we took on more gasoline. From Hudson to Blue Store, named from the prevailing color of its buildings, the roads were fair, and from there south they steadily improved, until the perfect macadam of Rhinebeck, Staatsburg and Hyde Park led us to Poughkeepsie, where good hotel and storage accommodations were found.

In the morning a front tire which was leaking was filled, and a horn added to the equipment, to replace a broken gong. A few necessary purchases were made, and a little after 11 we were on our way to New York. A lunch of crackers and milk was eaten beside the road just as we entered the hilly country. The road twisted and turned, always just escaping the towering elevation ahead, until Garrison was reached, whence we had hoped to cross to West Point. Upon inquiry we found that the rest of the afternoon would be consumed if we made this detour, so we snapped the camera at the Point, across the river, and climbed back again to the old post road. The way now led over fair roads to Nelson Hill, down which we coasted with brake hard down. It certainly must be a terrible

hard hill to climb. As we neared Peekskill the river again came into view, and was, from there on, frequently in sight. The scenery is truly beautiful; in my opinion, finer from the carriage road than from the river, for from the road one commands a view of both shores with the river between. Through Tarrytown, Irvington, Dobbs Ferry and Hastings our path led, and over roads which seemed ideal to us. As we passed into Yonkers we met a big touring car. The owner saluted us as we passed, at the same time giving a warning gesture as to our speed. I was at first a little puzzled as to just what he meant; but, running slower, I almost immediately passed

A MOUNTED OFFICER HIDING

behind some shrubbery. "Foxy Quiller!" Inquiry of him elicited the information that our speed must not exceed 8 miles, I believe it was. He was a trifle nonplused when I asked him as to within what limits this speed must be kept. He had had his orders and they covered his beat; but he really hadn't the least idea whether or not it was legitimate for one to go faster at any point between there and Albany. So we kept along carefully, reaching Manhattan through the Bronx, and before we knew it were in Central Park. It was just dark, and to us, who had never seen the park drives at night and were accustomed to the New England "no light" habit, it seemed like a fairyland. Bicycles, runabouts, publics, all glided along the winding course, with now and again a big gas headlight, or mayhap three on a touring car, rushing by. All too soon we were in Fifth avenue and then at our destination.

The next two days we devoted to exploring. By noon of the second day we had decided that an automobile tour to Washington and "doing" New York, in any sense of the word, were incompatible with our modest allowance for vacation. Speaking of allowances reminds me that I took my money along in American Express Company's travelers' checks. They are very comforting things to own, if one is convinced as thoroughly as I was, when, in Washington, that a thief is lifting them out of one's vest, in the night. But in New York, when I forgot I had spent my last cent of change and was on the point of steaming onto the ferryboat, then I realized the discomfort of losing that boat and of hustling round for someone to cash that check. Take my advice—carry your money in coin of the realm.

To resume: We crossed the Forty-second Street Ferry late Saturday afternoon, June 7. Landing and climbing the bluff, the boulevard was reached, which leads to Communipaw avenue—the old Newark plank road. I had wondered at the name and supposed that at some time in the distant past it had been literally so constructed. Great was my surprise when we ran onto the first board of about 5 miles of plank road, which, although pretty rough, gave a good surface and used comparatively little steam. Speed was, of course, wholly out of the question. At Newark, which is really quite a city, we took in some more gasoline and a little before 6 we were again on the road. The surface was excellent and we steamed along very easily. Just at dusk a shower came up, so the lamps were lighted, and, with top up and the boot in front, we felt prepared for any storm. But this particular shower was mostly wind, so in a few minutes the top was down again.

I ran out of water just as a country clubhouse came in view. A gentleman crossing the lawn was hailed, and, in answer to my appeal for water, he not only supplied the automobile with liquid refreshment but supplied me as well, and with a most excellent cocktail. His only grief seemed to be that my wife had not as yet learned to like the beverage. There was a jolly crowd in the dining room, and I have no doubt they enjoyed a very pleasurable evening. My temporary host accounted for my good fortune by explaining that he was that much abused person the chairman of the house committee. Whether it was a craving for sympathy that made him the cordial host he was or the native geniality and hospitality of the man I hardly knew at first. But intuition, seconded by judgment, soon assured me it was the latter.

AN INCIDENT IN AUTO TOURING.

I really hated to start along, particularly after his narration of an adventure some automobilists had with him last year. It seems these men met with some sort of an accident (which necessitated repairs) only a short distance away. But it was dark and they made for the nearest shelter, which happened to be the clubhouse. Here the few members in found their unexpected guests so congenial, as well as fatigued, that it required the administration of large quantities of restoratives to satisfy them of their safety. By this time, however, the fatigue, instead of diminishing, was so augmented as to settle pretty effectually the question of lodging. "But they had a bully time, anyway," he said, "and in the morning you never saw a more puzzled pair of boys. They hadn't the faintest idea of where they were or how they got there at first, but as recollection returned their apologies were so profound as to almost move me to tears." And, as he laughed over it, I saw the tears; so I knew he was telling the truth. It was not far from there to Metuchen, where we found, in the inn, one of the few decent country hotels we saw on the whole trip. After a stroll about the little village and a tempting supper we were ready for sleep.

Sunday morning was bright and clear, but with a strong wind, of course dead ahead. I confess that, while the roads were from fair to good most of the way, it was the most uninteresting day's journey we had had. The country was flat—monotonously so. The wind made steaming pretty slow, and this, too, detracted from our enjoyment. Passing New Brunswick, where we again 5 gallon can, we came, at noon, farm house, where we bought s and some bread and butter. M sandwiches, of course! But the so fierce that the chafing dish equal to the task, until we betho selves of a novel shelter. We cl the front box of the carriage, wh us as good protection as one c for. We plugged away again at wind, and finally arrived at Trent course evidently took us through est part of the town, for really i from charming, what we saw of i or four people of whom inquir made could tell us nothing of ho across to Morrisville, until one p the bridge on the right. Even woman who collected toll at the to this bridge seemed not only of what was at the other end o somewhat disgruntled to find we any curiosity on that point. M lay on the opposite bank, and fr on the road was easily followe rather sandy surface caused some but nevertheless the miles droppe At dark we were fairly in the Philadelphia, where we soon f commodations for ourselves and riage. It was there I had my onl

TILT WITH THE POLICE.

As I left the hotel to run ove storage station on Broad street, ignorant of the law, I lighted lights. Imagine my surprise to ha ficer, just as I reached the station, up in the most peremptory man demand what I was doing withou I looked down to find my lights want of oil) and explained to him it. He was horribly skeptical, and, if the station manager hadn fered, I am uncertain just how t would have terminated; whether have had free lodging, or paid the privilege of paying for lodgin latter is the solution he desired, But the manager, although a man stature, was of influence in som way; just how I never knew. feel so much indebted to him, thou paying him for putting 7 gallons line into a tank into which I ha been able to squeeze more than said he knew because he filled it so there was nothing left for m but apologize and pay.

Monday we spent in lookin Philadelphia and in taking a trip Fairmount Park—a beautiful pa too, and well worth a visit. Noo us there, so we drew up under a t while my wife prepared the pumped up some air. By the midd afternoon we were ready to s again. As I said, in speaking York, our obtaining more than th impression of the cities through passed was wholly incompatible

ıd purse. So, only too willingly, we lieu to Philadelphia and started on y to Baltimore. We were smiled at adelphia as well as in New York, ing our ambition on Washington. ladelphia they told us the road to gton was good, but beyond there ɔad; just how bad they didn't know. ɔf these statements were literally

ıt 4 o'clock on June 9, picking our t of the city over as good streets as ld find, the open fields were reached. ad was excellent and the country ing, in some intangible way seem- savor of the "South" for the first We rolled into Wilmington about 9 and housed the "bubble" in a hed and ourselves in a hotel. And did sleep after these long days in n air!

(To be continued.)

Diary Notes of a User.

By * * *

:xperiences recorded in my last ar- regard to troubles due to muddy were not my last. In starting for ıer resort a short distance out of we found the roads very bad in- having large puddles of muddy ı every hollow of the highway. Al- ery time we struck these puddles at eed the engine would stop, due to nd mud upon the spark plugs. It ı very pleasant operation to alight carriage into several inches of water and clean plugs and then ıe engine, and this process was re- several times. After running ı one very muddy place one of the absolutely refused to work, even peated crankings. After prolonged ation it was found that the mud led one of the inlet valve springs so tayed open and would not draw its After cleaning it with waste and plenty of oil, it was freed and we on.

undoubtedly an advantage to have ıne hung low, so that the centre of of the vehicle may not be too high, gives a high degree of stability, but the engine so near the ground t receive a great deal of the mud oad, and as no protection for the ugs and inlet valves is afforded by ers a great deal of trouble is sure perienced whenever the carriage is ı a wet day. It would seem that ort of an apron, as a protection this source of disturbance, ought part of the regular equipment of ehicle which is not admittedly a ather rig."

use insulating tubes of hard fibre, slip over the metal portion of the nd which extend some distance e connecting wire. This will often prevent the escape of the spark when there is water flying about the engine.

FAULTY CONTACT POINTS.

About this time I had almost constant trouble with my coil vibrators. It seemed impossible to keep them in adjustment, and, although the battery did not seem to be too strong, the contacts rapidly wore away, and the stationary contacts burned into the contact pieces upon the vibrator spring, so that they became very rough and deformed into a sort of cup shape. At last one of the contacts burned entirely through, so that the stationary point made no connection with the steel of the spring, giving no proper contact at all. On almost every run one or the other of the cylinders would stop work on account of the faulty action of its vibrator, and adjustments and cleaning of the contacts were necessary. Fortunately the coils were located in a box on the front dash, so that they could be adjusted from the seat, sometimes without necessitating shutting down the engine. The condensers seemed to be in good condition and the spark not unduly large, and I, therefore, attributed the trouble to the use of improper metal in the contact points. Whether these were of soft platinum or only of German silver I do not know, but I decided to fit them up so there could be no trouble from this cause. I accordingly secured two sets of the special hardened contact points manufactured by a well known platinum concern and had them put on. Since that time the coils have required no further adjustment and I think will continue to work very well. It is almost inexcusable for any coil to be put out with an automobile unless its contacts are of specially hardened platinum. They cost money, but we have to have them or else take the punishment, which seems to be inseparable with all faults in the electrical equipment.

CARRIAGE REWIRED.

About this time I decided to rewire the carriage entirely, as I had some suspicion of certain parts of the wiring. The work had been done with ordinary lamp cord, apparently of the cheapest variety, and very little pains had been taken to keep the insulation perfect. In one place wires were wedged in so tightly behind the gasoline tank that they could not be pulled out, and had to be cut off. They had no insulation over them except their cotton covering, and probably had been causing short circuits. The miserable lamp cord was all removed and rubber covered cable of No. 14 size put in in its place. Interior conduit tubing was used wherever space warranted and all connections were soldered. My sparking difficulties, I believe, will be greatly reduced in the future.

MOUNTING OF CARBURETORS.

I have learned some points about carburetors recently, and one is that they must be correctly mounted in the carriage or they will give irregular action upon grades. I had found a peculiar difficulty in climbing some steep hills. The engine did not seem to stop from overload, but on the steepest portions of the grade it would simply cease working. I puzzled over the matter a good deal, but finally came to the conclusion that it was a carburetor trouble. My carburetor is of the float feed, spraying type and is so mounted that the float chamber and the mixing chamber are not side by side, but one in front of the other. On a very steep hill the float chamber is very perceptibly higher than the mixture chamber, and if the level of the gasoline in the float chamber is equal to that of the spraying nozzle when the carriage is on the level, gasoline will constantly run out of the spraying orifice when the carriage is on a severe grade and the float chamber thus be elevated. The result is that the mixture is spoiled when going up a very steep hill. This trouble may be prevented by putting an elbow between the carburetor and the intake pipe, so that the two portions of the carburetor will be at the same level at all times.

A SKID.

After driving for several years without an accident of any kind I had my first experience in skidding upon the slippery streets, which the cold, foggy nights of fall are sure to give us. I was driving down a macadam street at perhaps 12 miles an hour, upon a slight down grade, when I came to a portion of the roadway which was of asphalt. As I was going straight along, with no thought of turning, I did not dream of any danger, but suddenly the rear wheels began to slip to one side of the roadway, which was quite strongly crowning, and I found that the machine was entirely beyond the control of the steering gear. After making several snakelike contortions, with the brakes hard down and the rear wheels locked from revolving, the machine being nearly turned around to face in the opposite direction, the vehicle took the curb and one of the three occupants performed a flying leap over the bonnet. As no one was hurt and as the machine still held together, I simply pulled in the reverse and backed out, and then continued on our way. Upon arriving at the stable we found a badly bent steering pivot, a slightly sprung axle, and one of the spring clips entirely bent out of shape, allowing the leaves of the spring to separate. This damage was all remedied by bending back the injured parts. I think that I shall always have a high respect for the resisting qualities of wood wheels, and I know that I shall always cherish faith in the safety and endurance of the heavy carriage. I do not believe that many of the light runabouts equipped with wire wheels would have come out of this accident so well. Contrary to the advice of many people, I believe that it is best to apply the brakes as forcibly as possible when a carriage begins to skid. One knows that the control of the direction of the vehicle is lost, and the best thing is to

reduce the speed as much as possible before the crash comes.

Apparently there is no lack of care in the manufacture of automobile chains. Once in a while, an unhardened side piece or rivet is accidentally assembled into a chain which is otherwise all right. I had noticed for some time that my driving chain was noisy and that there seemed to be an extra drag or load upon the engine. Upon examining the chain I found one of the links in which the rivets had almost worn out their side plates, which evidently were not hardened like the rest of the chain. It was only by the rarest good luck that the defect was noticed when it was, as a few more miles would have resulted in a broken chain and possibly a bad accident if it had happened upon a hill. The chain had been running out of pitch on account of this bad link and had worn the sprockets more than many months' ordinary use would have done.

THE FLOAT FEED PRINCIPLE.

I am beginning to believe that the float feed, spraying carburetor is far from being the perfect device that many regard it. It has the bad defect of giving a weak mixture when the engine is slowing down on full throttle; in other words, when it is doing its hardest work and needs a perfect mixture the most imperatively. The quality of the mixture is dependent, of course, upon the amount of the gasoline that is supplied relatively to the amount of air which is taken in, and the amount of gasoline supplied is dependent upon the degree of vacuum existing at the spraying nozzle. The amount of this vacuum is proportional to the amount of friction in the air intake passage and depends upon the velocity of the entering air. The result is that when the air is entering rapidly, as it is with the engine at high speed, there is a large amount of friction in the air inlet, a considerable degree of vacuum at the spraying nozzle and a very liberal amount of gasoline sprayed, but when the engine has slowed down almost to its minimum the conditions are reversed and a scant quantity of gasoline is supplied, giving a weak mixture. A foreign writer in a recent number of The Horseless Age speaks of the necessity for an air valve in the air intake, which shall automatically choke down the air entrance somewhat when the engine is slowed down doing hard work and open it again at high speed. I believe a device of this sort must be adopted if we are to expect the maximum power of which the engine is capable when it is running at its lowest speed.

The Professional Use of the Automobile in Winter.

By F. Krauss, M. D.

I used the automobile during the whole of last winter and so far this season. No difficulty was experienced from snow or ice, except as below stated.

In very light and slippery snowy weather when the snow balls on the horse's feet and makes it almost impossible for him to walk, the automobile will be apt to skid if a sudden turn is made at fairly high speed or upon sudden application of the brake. In my ignorance last year I tried both of these experiments, with the result that the machine described almost a complete semicircle, facing in a direction opposite to that in which I wished to go. One such experience is a sufficient lesson. With due care this will not happen.

In heavy snows the automobile will plow through as through mud, but will go readily where the snow is trodden down.

It is the custom in some cities to completely clear the sidewalks and car tracks of snow, making great piles 3 to 8 feet high between the track and sidewalk. It is then necessary, as with the horse, to follow the track and turn out, when necessary, where the snow is least deep. There is no trouble plowing through snow 2 to 3 feet deep, so long as a good start is obtained. After a stop is made in such a snow pile, it is necessary to go on the reverse gear, through the track already made. It is almost impossible to get a start otherwise, as the wheels fly around at great speed, but the automobile stands still.

Before finding this little trick considerable amusement was obtained by a party of laborers going to dinner, who stood about and watched me trying to work the machine out of such a place. They were not going to lose such sport by helping me with a friendly push, as I requested. They manifested much disappointment when I suddenly reversed my power and got out of my predicament easily.

No great trouble is experienced in going through thick slush, though the speed is somewhat retarded.

It should be unnecessary to state, however, that it is desirable to always pick the best roads and not strain the power of the machine unnecessarily just to see what it can do.

ANTI-FREEZE SOLUTIONS.

One feature of discomfort in the use of the automobile in winter is the use of the radiator. I have tried anti-freeze solutions and found them good for a little time. They soon become diluted by the addition of water to make up for "evaporation" and spilling through the overflow, wherefore some very cold morning one is apt to wake up and find the solution frozen. Sometimes the ice is very mushy, and is soon loosened up; at other times, however, a thin and narrow calibered tube remains frozen, interrupting the free flow of water, and the engine is suddenly found to be hot and powerless to go on high speed gear. I have at such a time thawed out this tube with a sponge and the hot water obtained from the hot cylinders.

Latterly I have had the water removed daily from the engine and radiator, as soon as the day's work was completed. I find this safest and surest. If anti-freeze solutions are used they should frequently be tested as to specific gravity and trouble thus avoided.

LUBRICATION.

Another source of trouble is in lubrication. The oil gets very thick and at first feeds very slowly if at all, and later is apt to feed too rapidly if adjustment is made for a thick oil. I use a moderately thin oil for the cylinders, and oil the parts well before starting with warmed oil. As the engine warms up it gradually runs better and loses its early stiffness.

EXPOSURE TO COLD.

I am frequently asked as to the great cold experienced when riding rapidly through the cold air or wind. I do not find it any colder than riding at a moderate pace, and prefer to ride without a top on the carriage in clear weather. My coachman says it is not nearly so cold as in a carriage, because the heat of the engine keeps the feet warm. I mention his opinion, since he has a better opportunity of knowing the cold, waiting outside of the house which I am visiting.

Nothing can be more bracing than an automobile ride in an open carriage on a clear frosty morning. The face soon becomes accustomed to the cold, the reaction from which puts the body into a glow, and the cold is forgotten.

PNEUMATIC TIRES

give no more trouble than in the summer time. During a thaw one is more liable to pick up a nail or tack, as these latter are more apt to be unobserved in the slush. Let me state here that when riding along the street I observe where I am going and give tacks, nails, especially old wood boxes or parts of them, a very wide berth. I never try to see whether my tire is puncture proof. The adage: "An ounce of prevention is worth a pound of cure," is a very appropriate one to the automobile user.

SPRINGS.

I have noticed that springs are more apt to break in very cold weather owing to increased brittleness, no doubt due to the contracted state of the steel molecules. Careful riding will reduce breakage in this direction to a minimum, especially if the springs are clamped to the wagon instead of being fastened with through bolts.

From the foregoing it must not be imagined that an automobile can be run throughout the winter without any trouble whatever, but in our climate (40th parallel) it can be run daily without marked difference throughout all of the seasons.

No storm has been so severe as to prevent my venturing forth, and I have saved much time by the use of the automobile. As troubles may come, however, at any minute, and in all seasons, it is well to be prepared for them.

E. W. Nicholson, Western representative of The Horseless Age, will have an office at Room 641, 203 Michigan avenue, Chicago.

GINNERS
GE.

er Feed System—Throttle lves—Control Levers

llustrates the boiler feeding ar- : as commonly used with fire · tube boilers. A is the water the boiler, C the crosshead he hand pump and E the suction ing from the tank A to the T- from which latter two pipes ;, one leading to the crosshead nd the other to the hand pump e suction pipe E is located a

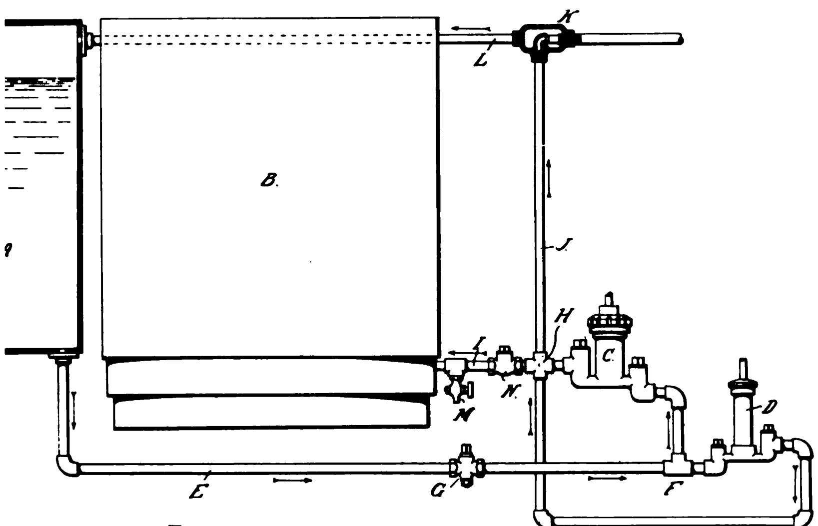


FIG. 1.

which can be closed when any :c., are to be made to either of ›s. The discharge pipes from ›s unite in a cross H, and from lead the feed pipe I, which en- ›iler at the bottom, and the pipe to the by-pass valve K. From ›s valve K a pipe L leads back ter tank, entering same near the the feed pipe I are located the 'alve M and a check valve N.

:ration is as follows: In regular

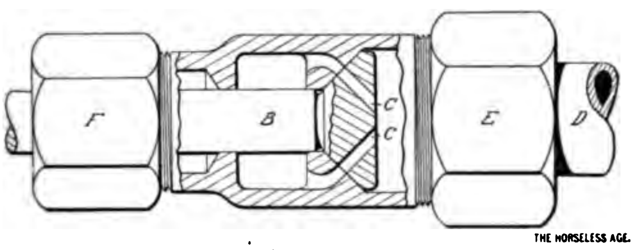


FIG. 2.

:he crosshead pump is continu- ›eration; it takes the water from m of the tank A through the ipe E, and forces it through the I into the boiler, the by-pass being closed. Should the water :e boiler become too high the by- K is opened. The pressure in the n automatically closes the check valve N, preventing the water in the boiler being forced back to the tank; but the water discharged by the pump now passes up through the pipe J, through the by-pass valve and back to the tank. Consequently the boiler feed has now ceased. It will be observed that the hand pump D is connected across the crosshead pump, drawing the water through the same suction pipe E and forcing it into the boiler through the same feed pipe I. The blow-off valve M is used to clear the boiler of any sediment held in suspension by the water, as already explained.

FEED CONTROL OF FLASH BOILERS.

In fire tube and water tube boilers the feed is manually controlled, by operating the by-pass valve when the water glass indication shows this to be necessary, but in flash boilers the feed control is automatic, as already explained. With such boilers an automatic diaphragm valve is placed where the by-pass valve K is shown located in Fig. 1. This diaphragm valve is operated by the boiler pressure; it is constructed on the same principle as the automatic fuel valve already described, only that it is more compact. The action of the flash boiler is such that when there is an excess of water in the boiler the pressure rises, and this automatically opens the by-pass valve, against the pressure of a spring which tends to close it, thereby causing the feed water to be returned to the tank.

THROTTLE VALVES.

Fig. 2 illustrates a form of throttle valve used on a well known make of steam carriage. The device comprises a main casting A with a seat for the conical valve B. The head of this valve is provided with two opposite longitudinal slots C C approximately at right angles to the bearing surface of the valve. When the valve is in the full open position these slots register with corresponding slots in the valve seat. By rotating the valve B on its seat the opening of the passage can be reduced from a maximum to any desired degree and the passage be closed completely. The steam enters the valve at one end, through the pipe D, which is connected to the valve casting A by the union E. The stem of the valve B passes through a stuffing box F. It is to be understood that a lever arm fastens to the stem of valve E at its outer end, and that this lever arm is suitably connected to the throttle control lever in the hand of the operator.

Fig. 3 illustrates another form of throttle valve, recently brought out. The body of this valve is composed of two parts, A and B, with an annular chamber between them. The part B is formed with a seat for the conical head of the valve C. On top of this conical head there is a cylindrical extension, which is drilled centrally lengthwise and also transversely with two holes at right angles to each other. In operating the valve it is shifted in an axial direction. Steam enters through the central drill hole in the cylindrical extension of the valve head. It passes through the transverse drill holes into the chamber surrounding the valve head, through the conical seat of the valve into the space surrounding the valve stem, thence through the openings D D into the annular space between the two parts of the valve body and out through the passage E, which latter is connected by a pipe to the engine. The stem of the valve C passes through a stuffing box F; the transverse openings in the cylindrical extension are obstructed more or less as the valve is moved in an axial direction, and the steam throttled accordingly.

THE CONTROL LEVERS.

The various control levers of steam carriages are arranged differently in different machines, but the arrangement shown in Fig. 4 is quite common. The three levers on the right of the drawing are located so they can be conveniently operated from the seat. The lever A is the throttle lever, B the reverse lever and C the by-pass lever or handle. These three levers move around a common axis, the levers A and B being fastened to tubes arranged concentrically over the rod of the by-pass valve. D in this figure represents the by-pass valve; E, a lever arm upon the inner tube, which connects by a link to the bell crank of the reversing gear; F, a lever arm upon the outer tube, which connects by a link to the throttle valve. In place

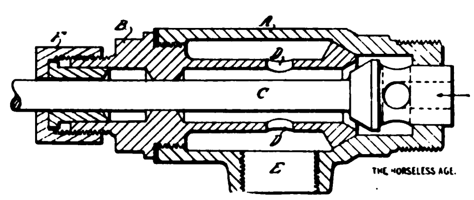


FIG. 3.

of the handle C a hand wheel is often used, with wire wrapped around the rim of the wheel to keep it at a low temperature, so as not to burn the hand when grasping it.

Several other methods of arranging the control levers may be briefly referred to. In some instances the throttle is operated by a crank on top of a post rising near the seat. The reversing lever is sometimes operated by a pedal. The pedal in that case is held in the position corresponding to forward motion by a strong coiled spring. Some vehicles have what is known as single lever control, in which the throttle and reverse gear are both operated by the same lever. When the lever is in midposition the throttle is closed and the link is on the centre. When the lever is moved in either direction the link is rapidly moved to one or the other extreme position, which is reached when the motion of the lever has been about half completed. Further motion of the lever does not affect the position of the reversing links, but it increases the throttle opening.

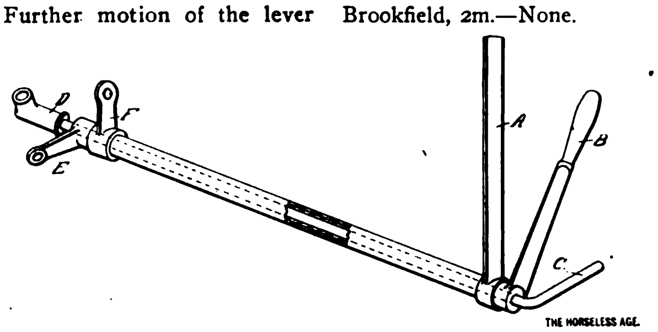


FIG. 4.

Reliability Contest Report—Penalized Stops, Repairs and Adjustments at Controls.

C 1—PACKARD.

None.—October 11, Springfield, straightening spring, tightening clutch, put in new spark plug; October 12, Boston, tightened chain, found clutch lever broken and took it out to have new one made (total time of work in garage, 35m.); October 14, Hartford, turned ball in universal joint on oil pump.

C 2—PACKARD.

Tightening clutch, 3m.—None.

C 3—PACKARD.

None.—October 9, Norwalk, adjusted brake cable slightly; October 14, Springfield, put on new brake cable.

C 4—PACKARD.

Cover over contact points became dislodged, 2m., 30s.; speck of dirt in point of contact, 30s.; repairing intake valve, 54m.—October 10, New Haven, adjusted contact spring and throttle regulator; October 11, Springfield, adjusted oil pump to work faster; October 13, Boston, changed battery connections; October 15, New Haven, brightened contact points.

B 5—PRESCOTT.

None.—October 9, Norwalk, engine parts lubricated; October 10, New Haven, removing and cleaning dust from four thumb nuts; October 12, Boston, chain strut rod adjusted; October 14, Springfield, chain strut rod adjusted.

B 6—FOSTER.

Tightened lubricator connection, 1m., 30s.; to open check valve, 10s.; to draw out vaporizer nipple, 6m., 30s.; withdrew at Hartford, October 14, on account of broken crank shaft.—October 12, Boston, replaced worn pump arm; October 13, Boston, replaced cracked nipple on steam pipe; October 14, Springfield, to repair leak, took off and repaired vaporizer, wired up broken water hand pump; October 14, Hartford, at starting broke off crank on the engine and withdrew from the contest.

B 7—LANE.

None.—None.

B 8—LANE.

Replacing pin valve stem lost from cylinder lubricator, 5m.; tightening union in water pipe while stopping for water at Brookfield, 2m.—None.

C 10—HAYNES-APPERSON.

Replacing broken chain, 13m., 45s.; rear cylinder missed fire and finally stopped; ignition pin required, also lubrication; forward cylinder did not stop, 15s.—None.

B 11—HAYNES-APPERSON.

None.—None.

B 12—HAYNES-APPERSON.

Near Fordham, funnel fell against magneto and closed circuit, cutting out sparker, 1m., 30s.; near Yaleville, repairing spring hangers and centre swivel which were injured by our having to run into ditch to avoid collision with another carriage, which veered toward us as we were about abreast of it to pass, 3h.—October 13, Boston, adjusted first speed clutch; October 13, Worcester, adjusted clips on one spring.

B 13—AUTOCAR.

Chain off pump, 9m.—None.

B 14—AUTOCAR.

New York to New Haven, dirty spark plug, 6m., 10s.; adjusting spark coil, 4m., 15s.; adjusting spark coil, 9m.; New Haven to Boston, missed all controls, no record of stops; Boston to Worcester, adjusting mixture, 1m., 2s.; tightening clutch, 2m., 41s.; withdrew between Worcester and Springfield on account of damaged gear shaft.

B 15—WARD LEONARD.

Put in new spark plug, 2m., 35s.; slewed around completely on wet and muddy streets in Worcester, 6s.; cause could not be ascertained, 45s.—October 9, Norwalk, main clutch lubricated, replaced spark plug, one joint lubricated.

B 16—WARD LEONARD.

Engine stopped at hill beyond Mianus, put in new spark plug, 5m., 15s.; adjusting intake valve, 18m.; making new key for valve, 20m.; trouble with gasoline valve, 15s.; changing battery, 5m.; adjusting bearings due to running on a flat tire, 32m.; oil valve in motor case opened and oil escaped motor stopped on heavy grade, 2m.; motor stopped because operator accidentally opened igniter switch while adjusting oil feed, 1m.; motor stopped while running in ditch up hill at Windsor to pass steam roller, 15s.; cleaning spark plug, 3m.; stopped to close oil valve in bottom of motor case, opened by running over large dog, 20s.; cleaning spark plug, 3m., 30s.—October 15, New Haven, cleaning spark plug.

C 17—APPERSON BROTHERS

Repairing brake, 22m.—October 11, Worcester, repacking water circulation pump; October 12, Boston, water leak resoldered.

C 18—BRAZIER.

Motor stalled on hill, 1m.; motor stalled on hill, 41s.; clutch stuck, 15s.; motor stalled, 20s.; motor stalled, 35s.; motor stalled, 47s.; motor stalled, 14s.; motor stalled, 38s.—October 10, Hartford, overhauled speed clutch, loose screw; October 11, Springfield, tightened up screw on speed change lever; October 13, Worcester, procured a cast gear to replace broken one; October 14, Springfield, wired water cooler, put in spark plug, replaced nuts on gear case, cleaned cylinder oil pump; October 14, Hartford, repaired broken front wagon spring; October 15, New Haven, cleaned admission valves, adjusted speed clutches and spark coils and put in new front spark plug; October 15, Norwalk, adjusted sparking apparatus.

A 19—TORBENSEN.

Broken wire, 5m.; broken wire, 3m.; water, 4m.; plug fouled, 4m.; loose water connection, 3m.; spark, 5m., 30s.; spark, 3m., 15s.; admission valve broken, 13m., 30s.; broken wire, 4m., 45s.; admission valve broken, 8m., 15s.; vibrator, 4m., 45s.; vibrator, 4m.; vibrator, 1m., 15s.; vibrator, 1m., 30s.; broken wire, 5m., 30s.; vibrator, 4m., 15s.; tire burst and machine became unmanageable, went upon the sidewalk, wrecked one wheel, bent spring and frame; repairs completed at 7 p. m., and started for Boston; 5 miles before reaching Boston water in cylinder; left machine and went into Boston on trolley; brought machine into Boston Sunday afternoon and found loose plug in cylinder head; spark, 2m., 15s.; spark, 6m., 30s.; spark, 11m.; vibrator, 6m., 30s.; water pipe and spark, 55m.; carburetor stopped up, 16m.; missed control, Worcester to Springfield; broken wire, 1m., 15s.; spark, 6m., 15s.; spark, 2m., 30s.; stopped for new battery, 20m.; broken water connection, 16m.; spark, 2m., 15s.; spark, 45s.; broken steering knuckle, 1h., 37m.; broken wire, 1m., 30s.; spark, 3m., 15s.—October 10, New Haven, washers

e removed on pump connections and cleaned; October 11, Springfield, .et valve and spark plug; October ·ton, examined cylinder and found ; had become loose in cylinder head; 13, Worcester, new spark coil and October 14. Springfield, lengthened od.

A 20—PIERCE.

spark plug, 4m.—October 10, New oiled and adjusted bearing on haft; adjusted trembler and oiled ssion gear; October 11, Springfield, ıd cleaned spark plug; October 11, :er, spark plug adjusted; October :on, adjusted spark plug and trem- ed up gears; October 13, Worcester, l spark plug, oiled up; October 14, eld, cleaned spark plug; October 14, d, put in spark plug; October 15, ıven, put in spark plug; October 15, <, cleaned spark plug.

B 21—DARRACQ.

tor obliged to put on emergency) save breaking spring in rain gul- ich he did not see soon enough on of bad dust. In confusion engine pped for 30s.—None.

C 23—APPERSON BROTHERS.

ı loose, 3s.; clutch loose, 6s.; re- driving pulley of circulating pump airing joint in water circulating ween pump and coils, 1h., 6m.; re- circulating pump, 3m.—October 11, er, adjusted change speed; Octo- Boston, put new leather face on ɔr driving circulating pump.

B 24—WHITE.

—October 13, Boston, tightened ıd set up stuffing boxes; October ngfield, opened fire regulator a lit- ıed out gasoline pipe and tightened vaporizer; October 15, examined ılator, opened fire regulator a lit-

B 25—WHITE.

—None.

B 26—WHITE.

—None.

B 27—WHITE.

—October 9, Norwalk, cleaned con- sponge; October 10, New Haven, condenser sponge; October 11, :ld, cleaned condenser sponge; Oc- Boston, cleaned condenser sponge; 14, Springfield, cleaned condenser washed out water tank; October Haven, cleaned condenser sponge.

B 28—WHITE.

steam pressure, 4m.—October 11, :ld, put new plunger in air pump.

C 29—LOCOMOBILE.

n admission valve, 15m., changing ı Leicester Hill, 15s.—October 10, l, cleaned govenor valve; October ngfield, put in new exhaust valve; 13, Boston, new spark plug and one admission valve; October 13, er, new spark plug; October 14, :ld, new spark plug; October 14, l, sheared off six bolts in bevel ne new brake shoe; October 15, New Haven, two new spark plugs, one new brake band.

B 30—STEVENS-DURYEA.

Operator neglected to open cock between gasoline tank and carburetor before starting, causing stop one block from control, 30s.—October 9, during 1m. 30s. stop at railroad crossing pushed gear case back so it would not rattle; could have been done running; no adjustments.

B 31—STEVENS-DURYEA.

Broken chain, 10m.—None.

B 32—RAMBLER.

Engine stopped caused by dust clogging vibrator, 30s.; hot engine, filled water tank, 3m.—October 11, Springfield, adjusted chain.

B 33—GROUT.

For water, 3m., 10s.; for water, 4m., 30s.; for water, 6m., 15s.; for water, 8m., 30s.; for water, 11m., 30s.; for water, 6m., 45s.; for water, 11m.; for water, 3m.; for water, 5m.; for train, 30s.—October 11, Springfield, adjusted chain and tightened brake; October 14, Springfield, new water glass as precaution, other not broken but leaking; October 14, Hartford, cleaned check to cylinder lubricator; October 15, New Haven, repaired iron body hanger.

C 34—LOCOMOBILE.

Replacing new valve in top of water pump, 1h., 10m.—October 11, Worcester, one new water glass; October 15, New Haven, cleaned boiler gauge and adjusted pump rod.

B 35—LOCOMOBILE.

To light fire, 30s.—October 13, Worcester, piston packed; October 14, Springfield, one new conecting rod; Hartford, piston packed.

B 36—LOCOMOBILE.

October 15, towed into New York control from Seventieth street, having run out of water.—October 10, New Haven, lubricated and adjusted a few parts of the machine; October 10, Hartford, took water and pumped air; October 11, Springfield, repaired and cleaned oil cup to air pump; October 12, Boston, repaired oil cup to air pump, put in small piece of piping and union; October 13, Boston, cleaned and lubricated parts; October 13, Worcester, lubricated parts and took on water; October 14, Springfield, lubricated parts and took on water; October 15, New Haven, lubricated machine parts.

B 37—ELMORE.

Open holes in muffler, did not stop motor, 5m.—October 10, Hartford, tightened bolts on cylinder heads; October 11, Springfield, tightened bolts on cylinder heads; October 13, Boston, tightened connecting rod on one motor.

B 38—ELMORE.

One cylinder missed fire and motor stopped, 3m., 47s.; rubber apron came untied and wind blew it into the speed clutches (took three stops before trouble was located), 9m., 47s.; 3m.; 3m., 45s.; leak, radiator lost water, engine heated up, 5m., 40s.; 10m.; 16m.—October 10, New Haven, oiled up; October 11, Springfield, oiled and adjusted, shortened brake rod; October 12, Boston, tightened chain, examined spark plug, tightened belt on magneto; October 14, Hartford, set up igniter spring.

B 39—DE DION-BOUTON.

Smoky plug, 2m.; tightened inlet valve, 56s.; replaced broken trembler, 3m., 30s.; adjusting inlet valve, 2m., 30s.—None.

B 40—AUTOCAR.

Vaporizer flooded, 4m.; broken stop cock, gasoline lost, 24m.; gasoline feed tube broken, 9m.; broken wire, also friction pulley to pump, 2h., 9m.; overheated engine, 40m.—None.

A 41—OLDSMOBILE.

Broken gasoline pipe to mixer and sulphured clutch, 4m.; pump troubles, 10m.; operator's sleeve shut off spark, 5s.; water in carburetor, 2m.; broken wire, 5m.—October 9, Norwalk, link taken out of chain, tightened clutch; October 10, New Haven, replaced cylinder head gasket; October 11, Springfield, replaced cylinder head gasket; October 11, Worcester, adjusted vibrator and cleaned contact; October 12, Boston, replaced cylinder head gasket; October 13, Worcester, adjusted vibrator; October 15, New Haven, adjusted vibrator, cleaned carburetor and repaired the brake.

C 42—FOURNIER-SEARCHMONT.

None.—October 10, New Haven, examined spark plug and inlet valve; October 12, Boston, ground both exhaust valves and cleaned spark plugs; October 13, Boston, examined float chamber, added tension to commutator spring, cleaned vibrating coil contact points; October 14, Springfield, examined spark plugs, cleaned contact points of vibrating coil; October 15, New Haven, examined spark plugs, cleaned contact points of vibrating coil.

C 43—PACKARD.

Leak in water system, 10m.; ignition troubles, 55m.; lubricator, 2m.; broken wire, 40s.; motor stopped, gas not feeding, 2m. 40s.; carburetor float broken and chain adjusted, 10m., 50s.; gears examined on hill, 1m., 40s.; hot box, front wheel bearing cup ground to pieces, leaves of front spring out of line, 1h., 38 m.; hot box, front wheel bearing cup ground to pieces, leaves of front spring out of line, 1h.; motor stopped, 8m.; spark trouble, 19m.; short circuit, 1m.; front wheel hot, ball bearing broken, 30m.—October 12, Boston, changing four cells in batteries, tightening dust cap on outside of hub of front wheel; October 13, Boston, cleaned carburetor; October 13, Worcester, new bolt in strut rod of chain; October 14, Springfield, bolt drilled out of strut rod and new one put in; October 15, Norwalk, new cone put in right front wheel.

B 44—DARRACQ.

Missed controls, New York to New Haven, broken inlet valve, piece of metal in cylinder; New Haven to Hartford, short circuit in spark plug and trembler adjusted, 18m., 45s.; broken sparker connection, 28m., 45s.; gasoline feed blocked by piece of waste in pipe, 18m., 1s.; smoky plug, 4m., 41s.; missed controls, Springfield to Boston, broken piston at Spencer, new piston pro-

cured from New York and put in at Spencer, arrived in Boston 2:52 p. m., Sunday, October 12.—October 9, Stamford (not Norwalk), new front spring, new inlet valve, valves ground and plugs cleaned; October 12, Boston, machine not touched after arriving and taking on gasoline; October 13, Boston, plugs cleaned, new connection made between wire and plug; October 14, Hartford, wooden block put in to protect cracked left front spring; October 15, New Haven, straightened rear lamp bracket damaged by collision.

B 45—FRANKLIN.

Battery failure, no spark, 4m.; no spark, 30s.; engine stalled trying to run too slowly, 15s.—October 9, Norwalk, inspection; October 10, New Haven, general cleaning and inspection; Hartford, inspection; October 11, Springfield, general cleaning and inspection; Worcester, inspection; October 12, Boston, cleaned and adjusted; October 13, Worcester, inspection; October 14, Springfield, cleaning and inspection; Hartford, two cells of battery and inspection; October 15, New Haven, inspection; Norwalk, general inspection and adjustment.

B 46—KNOX.

Missed control New Haven to Hartford, missed control Hartford to Springfield, damaged crank shaft repaired in New Haven with local assistance; arrived Springfield 12:15 a. m., October 11.—October 9, Norwalk, oil cup fitted on cylinder; October 10, New Haven, tightened chain and coupling of gasoline feed pipe; October 11, Springfield, tightened crank pin box, took up high speed clutch; October 14, Springfield, tightened chain; October 14, Hartford, reset ignition cam; October 15, New Haven, adjusted contact points.

B 47—KNOX.

None.—October 10, Hartford, tightened belt on fan; October 11, Springfield, oiled and made few adjustments; October 14, Springfield, adjusted connecting rod, ground in exhaust valve.

B 48—KNOX.

Stalled motor, 20s.—October 10, New Haven, adjusting electric vibrator; October 11, Springfield, adjusting vibrator, took up lost motion on crank pin, removing gasoline tank in order to do this, cleaned spark plug; October 13, Boston, took up lost motion on crank pin; October 13, Worcester, resin on fan belt; October 14, Springfield, tightened chain, set up nuts in frame construction.

B 49—FIAT.

At Worcester repairing gear case, adjusting valves and magneto, towed into New York control from Eighty-fifth street, collar on gear shafting stuck, 1h., 15m.—October 10, New Haven, engine oiled and fan belt tightened; October 11, Worcester, repaired gear case, adjusted valves and magneto; October 13, Boston, examined and adjusted inlet valves; October 14, Springfield, temporary repairs to one spring; October 15, New Haven, repaired gear case.

C 50—NEFTEL.

Lost brush holder spring on generator—removed holder, 23m., 30s.; blew out fuse, 30s.; engine hot, got water and charged battery with motor set, 1h., 4m., 10s.; gasoline out, 20m.; ignition wire off, 30s.; hill, water circulation failed, withdrew at Norwalk, 1m.

B 51—STEARNS STEAM.

None.—October 9, Norwalk, replaced broken nipple in safety valve cock; October 10, New Haven, replaced bolt in compensating gear cover, replaced water glass; October 12, Boston, repaired broken mud guard with wire, tightened up piston stuffing boxes; October 15, New Haven, packed glass in sight feed lubricator and put clip on side bar.

C 52—WINTON.

Stalled on hill, 10s.; flooded carburetor, 20s.—None.

A 54—DE DION-BOUTON.

Smoky plug, 2m., 30s.; repairing steering knuckle, which was broken by sudden turn in trying to avoid collision with a dog at New Britain, repaired steering knuckle broke after leaving Springfield, 1h., 45m.; missed controls, Springfield to Boston and withdrew at Boston.—October 9, Norwalk, cleaned plug and put in new inlet valve; October 11, Springfield, refitted and repaired knuckle.

B 55—U. S. LONG DISTANCE.

Oiling, 2m.—None.

B 56—U. S. LONG DISTANCE.

Water, 1m., 30s.; cooling motor, 2m.; cooling motor, 15m.; examining front axle, 20m.; replacing broken steering knuckle, 1h., 7m., 30s.; blew out valve packing, 5m., 15s.; overheated motor, 7m., 30s.; wooden bumper under weak spring fell out, 7m., 30s.; tightened inlet pipe, 4m.; replacing wooden bumper, 9m.—October 10, New Haven, inspected crank case; October 12, Boston, straightened axle, took up bearing on engine; October 14, Hartford, set up a few nuts; October 15, New Haven, replaced wooden bumper under spring, which was broken.

A 57—PIERCE.

Replaced broken inlet valve stem.—October 10, New Haven, cleaned plug; October 10, Hartford, cleaned plug; October 11, Springfield, cleaned plug; October 11, Worcester, new spark plug, tightened high speed clutch; October 13, Boston, cleaned plug; October 14, Springfield, cleaned plug.

A 58—RAMBLER.

Battery, 3m.; water, 6m., 30s.; ignition trouble, 11m.; gasoline, 9m.; engine stopped, 1m.; valve set, 5m.; valve set, 5m.; engine stopped, 15s.; ignition trouble, 2m.; ignition trouble and commutator cleaned, 4m.; ignition trouble and commutator cleaned, 4m.; commutator cleaned, 30s.—October 9, Norwalk, cleaned plug; October 10, New Haven, cleaned plug and adjusted igniter; October 10, Hartford, vibrator adjusted and new battery connected; October 11, Springfield, vibrator adjusted and battery connected; October 11, Worcester, cleaned valves; October 13, Boston, new coil attached and new spark plug; October 13, Worcester, carburetor adjusted, cam repaired, also battery put in; October 14, Springfie[ld, ad]justed vibrator and set up nuts; [October] 15, New Haven, adjusted vibrat[or,] tightened chain.

C 59—WINTON.

No spark, 2m., 55s.; compensating troubles, 5m., 3s.; spring on trembl[er,] 36s.; new spring on trembler, 2m[.,] new spring on trembler, 3m., 30s.—[October] 10, New Haven, steering head crack[ed,] reaching control and repaired; Oct[ober] Hartford, pin in pump pinion and [a] spark plug; October 11, Worcester, pump pinion; October 12, Boston, ta[king] parts and cleaning and replacing the [Oc]tober 13, Boston, strengthening [...] heads by clamps, replacing covers o[n] bler.

B 60—GROUT.

Replaced water glass, 5m.—Octo[ber] Springfield, replaced water glass; [October] 11, Worcester, replaced water glass [Octo]ber 14, Springfield, replaced water [glass;] October 15, New Haven, replaced [water] glass, including one gasket for same.

B 61—GROUT.

Putting in water glass while stopp[ed for] water, 9m., 30s.; steam low on Leicest[er hill,] 5s.—October 9, Norwalk, water gl[ass re]placed; October 10, New Haven, br[ake rod] and chain tightened; October 12, [Boston,] brake rod and chain tightened; Oct[ober] Springfield, chain tightened.

C 62—TOLEDO GASOLINE.

Bad spark, 1m.; bad spark, 2m., 4[...] in new plug, 3m. 15s., put in nev[...] 1m.—October 9, Norwalk, two new plugs; October 11, Springfield, thre[e] spark plugs; October 15, Norwa[lk, re]paired governor.

A 63—OLDSMOBILE.

None.—October 13, Boston, a[...] chain; October 15, New Haven, tig[htened] high speed clutch.

A 64—OLDSMOBILE.

Carburetor flooded, 5s.—October 1[0, New] Haven, chain tightened; October 14, S[pring]field, chain tightened; October 14, Ha[rtford,] chain tightened.

B 65—AUTOMOTOR.

Tightening bolt on rear gear drive tightening bolt on rear gear drive replacing driving pin on pump, 3m.; [tighten]ing commutator chain, 6m.—None.

C 66—PANHARD & LEVASSOR.

Repairing pump wheel, 10m.—No[ne.]

C 67—FOURNIER-SEARCHMONT.

None.—October 11, Worcester, n[...] put in brake band.

B 68—FREDONIA.

None.—October 13, Boston, tig[htened] chain.

B 69—FREDONIA.

Hot transmission gear, 18m., 2[...] pairs to clutch in New Haven, Frida[y even]ing, October 10, after starting tin[...] 23m., 15s.; withdrew at Worcester [Octo]ber 13, on account of broken pun[...] damaged gear.—October 10, New [Haven,] adjusted transmission, adjusted lu[...] of motor and oiled up, drilled out s[...] clutch and put in new one, lost 3h[...]

DATA OF TIRES, STOPS AND REPAIRS IN THE RELIABILITY CONTEST.

Weight without Passengers.	No. of Passengers.	Make of Tires.	Kind.	Size.	Weight. Lbs.	Retail Price.	Total Weight Per Inch Width.	Road Troubles—Repairs, &c., at Controls.
3955	6	Goodrich	Double	36x5	30	$62.00	971	Puncture, 31m.; puncture, 30m.—One burst at control.
2615	3	Diamond	Single	34x4	30	41 50	766	None.
2690	3	Goodrich	Double	34x4	23	62 00	785	None.
2510	3	Goodrich	Double	34x4	23	62.00	740	Pumping, 9m.—One inner tube replaced.
1435	2	Fisk	Single	28x2½	11	16.00	694	None.
1420	2	Diamond	Single	30x3	28.5	29 50	573	None.
1790	2	Hartford	Single	34x3	16	11.70	697	None.
1690	2	Hartford	Single	34x3	16	14 30	663	None—One replaced at Boston control.
2140	4	Goodrich	Double	36x4	25	40.00	685	Replacing inner tube, 41m. 30s.
1945	2	Goodrich	Double	36x3½	16	35.00	641	None.
1370	2	Intern.	Single	32x3	24	30.00	557	None—Replaced one tire at Springfield; found nails in tire but no leaks.
1610	2	G. & J.	Double	3	56½	28.75	637	None.
1640	3	G & J.	Double	3	56½	28.75	730	None—Car withdrew on return.
1765	2	G & J.	Double	3½	14	24.60	590	None—Car withdrew on return.
1875	3	G. & J.	Double	3½	14	24.60	664	Repair, 1h. 28m.—Repairs at Worcester, Springfield, and New Haven control on return.
2580	4	Goodrich	Double	36x4	21	65.00	795	None.
2850	2	Goodrich	Double	36x4	27	65.00	788	None.
990	2	Dunlop	Double	30x3	38	72.90	330	Puncture, 17m 45s; pump, 4m. 15s.; puncture, 31m. 30s.; burst and caused loss of control.
832	2	G. & J.	Double	28x3	48	24.00	377	Pump, 5m.; pump, 2m.; pump, 4m
1612	2	Michelin	Double	30x3 4	16	38.00	562	Replaced inner tube and cover, 30m; replaced inner tube, 20m.; pump, 10m.—Replaced inner tubes at New Haven, Springfield and Boston.
2690	3	Goodrich	Double	36x4	21	65.00	785	None.
1505	2	Goodrich	Double	30x3½	16¼	41.00	516	Tire repair, 21m. 30s.
1475	2	Goodrich	Double	30x3½	16¼	41.00	507	None.
1485	2	Goodrich	Double	30x3½	16¼	41 00	510	None.
1675	2	Goodrich	Double	30x3½	16¼	41.00	564	None—Replaced left hand rear tire at Hartford. Flap of old tire was torn and tube pinched. Tire went flat 8 miles before reaching Hartford, but did not stop to repair it. Probably punctured while going over new foundation for macadam road at this point.
1690	2	Goodrich	Double	30x3½	16¼	41.00	569	Puncture, 42m.; pump, 8m.; replacing inner tube, 1h.—Replaced inner tube at Boston and repaired at Worcester.
2340	4	Goodrich	Double	34x3½	15	45 00	840	None.
1155	2	Fisk	Single	28x3	13	18 90	485	None—Replaced rear tire (punctured) at Norwalk.
1180	2	Fisk	Single	28x3	13	18.90	493	None.
1112	2	G. & J.	Double	3	11¾	24 50	470	None.
1130	2	Goodyear	Single	30x2½	12	15.00	572	None.
3030	2	Goodrich	Double	3½	10	28.00	951	New inner tube, 1h. 5m; new inner tube, 46m.; new inner tube and bad hand pump, 1h. 9m; new inner tube, 58m.
1210	2	Diamond	Single	28x2½	9	15.00	604	Pump, 4m.—Two new rear tires put on at Worcester.
1215	2	Diamond	Single	28x2½	9	15.00	606	Valve leak, 5m.—One new tire at New Haven.
1220	2	Diamond	Single	3	15½	26.00	506	None.
1280	2	Diamond	Single	3	15½	26.00	526	None—Pumped up one tire on October 9 at control.
1395	2	Michelin	Double	3	15	15.00	565	None—One new inner tube at Hartford.
1430	2	Dunlop	Double	30x3	12	26.00	577	None.
860	2	Fisk	Single	28x2½	10	12.00	444	None.
2200	4	Dunlop	Double	32x3½	20	30.75	800	None—Pumped one at New Haven; two at Springfield.
2600	4	Diamond	Single	34x4	30	52.00	800	None.
1885	3	Michelin	Double	30x3	16	38.00	778	None.
1150	2	Goodyear	Double	30x3	—	18.00	483	None—Replaced one shoe at New Haven; another at Boston.
1465	2	Fisk	Single	30x3	14	17.00	588	None.
1435	2	Dunlop	Double	30x3	15	17.00	578	None.
1425	2	Dunlop	Double	30x3	15	17 00	573	None.
1920	2	Contin'tl	Double	35x3.6	15	16.25	611.	None—Replaced one inner tube on account of defective valve.
1620	2	Fisk	Single	28x3	12½	26 00	640	None
2300	4	Goodrich	Double	32x4	52	49 00	725	None—Inflated at Hartford, Boston and Worcester.
990	2	Dunlop	Double	3	12	25.00	430	Inner tube burst, 22m; outer tire slipped off. 27m; puncture, 16m. 30s.
1571	2	Goodrich	Double	30x3	14	42.50	624	None.
1610	2	Goodrich	Double	30x3	14	42 50	636	None
837	2	G. & J.	Double	28x3	12	24.00	379	None.
1100	2	Diamond	Single	2½	9	15.00	560	None.
2340	2	Goodrich	Double	4	30	48.00	660	Trouble, 14m.; burst, 46m.—Replaced two at Hartford.
1145	2	Diamond	Single	28 & 30x 2½	12	15 00	598	None.
1100	2	Goodyear	Single	28 & 30x 2½	12	15.00	560	None.
2915	4	G. & J.	Double	32x4	25	49 25	879	None—One new inner tube at Hartford.
945	2	Goodrich	Double	28x2½	10 5	12 50	498	None.
920	2	Dunlop	Double	28x2½	10.5	—	488	None.
1550	2	Diamond	Double	30x3½	18	35.00	529	None.
2790	3	Michelin	Double	—	—	—	—	Right rear tire, 40m.; left front tire, 20m.; right rear tire, 1h.
2610	3	Dunlop	Double	32x3½	20	30 75	874	None.

DATA OF TIRES, STOPS AND REPAIRS IN THE RELIABILITY CONTEST—Continued.

No. of Vehicle.	Weight without Passengers.	No. of Passengers.	Make of Tires.	Kind.	Size.	Weight. Lbs.	Retail Price.	Total Weight Per Inch Width	Road Troubles—Repairs, &c., at Controls.
B 68	1400	2	Goodrich	Double	3	80	$18.75	566	Puncture, 50m.—New inner tube at Hartford; new tire at Springfi ld; puncture repaired at Springfield.
B 69	1390	2	Goodrich	Double	3	80	18.75	563	Front tire came off and right rear punctured, 2h; replaced tube on left rear wheel, 2h 15m.—Wrapped right rear casing with tape at New Haven; examined tires at Springfield; replaced one casing and one tube at Boston.
B 70	1500	2	Diamond	Single	34x2½	——	32.00	720	Inflated tire near Chestnut Hill, 6m.; tire pulled off in Spencer, 25m; tire relashed, 5m 15s; tire relashed, 4m; relashed, 2m.; relashed, 8m; tire relashed, 2m.—New tire at Springfield.
A 71	920	2	Michelin	Double	28x3½	12	35.00	348	None
B 73	1640	3	Diamond	Single	30x3	14	22.00	697	Trouble, 10m.
B 75	1180	2	Fisk	Single	2½	11	15.00	592	None.
C 76	2065	3	Dunlop	Double	32x3½	20	30 75	719	None.
B 77	1135	2	Rambler	Single	2½	——	——	574	Puncture, 9m.
A 79	920	2	Diamond	Single	28x2½	10	15.00	.488	None.
B 80	1420	2	Diamond	Single	30x3	28 5	27.50	573	Resetting, 16m.

15s., getting started; October 11, Springfield, jacked up machine and lubricated; October 13, Boston, oiled up.

B 70—FOSTER.

None.—None.

A 71—DE DION-BOUTON.

Renewed spark plug, 2m., 30s.; motor stalled, jerked clutch too suddenly, 1m.; broke casting in transmission gear, 13m.; repaired spark plug, 5m.; towed into New Haven, broken piston.—October 10, New Haven, cleaned plug, trembler and inlet valve; October 15, New Haven, put in new piston and new connection rod bushing at crank end; October 15, Norwalk, repaired casting broken in the morning.

B 73—FOSTER.

For air pressure, 3m., 30s.; for air pressure, 30s.; to light fire, 4m.; for air pressure, 1m, 30s.; to repair water pump, 1h., 2m.; fixed lubricator, 10m.; to put on chain, 10m.; for air pressure, 1m.; to repair broken nipple, 23m.; to repair hand pump, 22m.; on Brookfield Hill, air tank, observer and contestant walking, 30s.; on top of Brookfield Hill, 3m.; soldering air tank, 1h., 30m.; to pump air, 1m.; for air pressure, 3m.; repairing pump and adjusting water glass, 1h., 10m.; cleaning check valve, 30m.; steam pressure, 1m.; relighted fire and set up union, 2m.; penalty for water (over 20m. allowance), 12m.; penalty for water (over 20m. allowance), 6m.; air pressure, 3m.; let out water from air tank, 1m.—October 12, Boston, repaired air tank; October 12, Boston, cleaned check valves and tightened up machinery.

B 74—THOMAS.

Withdrew at Baychester, 14 miles from New York, owing to broken connecting rod.

B 75—RAMBLER.

Battery connection, 1m.; lost pin out of inlet valve and short circuit, 18m.—None.

C 76—FOURNIER-SEARCHMONT.

None.—October 12, Boston, repaired blown out muffler.

B 77—RAMBLER.

Lost split pin, 7m., 20s.—October 9, Norwalk, tightened clutch; October 10, New Haven, tightened nuts on axle; October 15, New Haven, one spark plug; October 15, Norwalk, wired rear axle.

A 79—OLDSMOBILE.

Stopped to shut pet cock on cylinder, 30s.; water supply tank leaking, 12m.; engine weakened going up hill, 30s.; wrong mixture, engine stopped, 1m., 10s.; replaced spark plug, 2m.; vaporizer trouble, 6m.; vaporizer trouble, 4m.; out of gasoline, 15m.—October 12, Boston, operator took four hours for adjusting, cleaning and tuning up; October 13, Boston, fifty-five minutes, adjusting and oiling.

B 80—FOSTER.

Light pilot, 1m.; lost pin in brake rod, 4m.; to light pilot, 1m.; putting in new lock nut screw on engine bearing, 2m.—October 13, Boston, repaired brake rod shackle, also repaired cylinder oiler; October 14, Springfield, adjusted cylinder oiler; October 14, Hartford, adjusted automatic regulator; October 15, New Haven, adjusted brake.

Test of Steel Roadway.

Some trials of tractive power required were made on the experimental stretch of steel roadway in Murray street, New York, on December 17, under the direction of Gen. Roy Stone, chief of the Bureau of Road Inquiry of the Agricultural Department. The trial consisted in having a four wheeled cart, weighing 3,700 pounds, drawn up the road by a number of men, who applied their efforts to a rope attached to the cart, a spring scale being inserted in the rope. The grade of this part of Murray street is said to be about 5 per cent. On the Belgian block pavement an average tractive effort of 160 pounds was required, but on the steel rails the average was only 100 pounds. It was found that the tread of the vehicle was slightly too wide for the gauge of the roadway, causing it to run against one or the other of the two outer ridges at every turn, and completion of the trials was therefore deferred to a later period.

Amendment to A. A. A. Bylaws.

At a special meeting of the American Automobile Association, held December 9, 1902, the bylaws were amended so that the annual dues are now $1 per annum for each active, associate and life club member (payable semi-annually) instead of $2 per annum, as heretofore. This action was taken with the belief that all the clubs in the United States not now members would, under such conditions, find it advisable to join the association and make it a thoroughly national and representative organization.

Following is a copy of the amended bylaws: Amend Chapter IX to read as follows:

"The entrance fee shall be $10 per club, to accompany application for membership. The dues shall be $1 per annum for each active, associate and life member of each club, and shall be payable semi-annually in advance on the 1st day of April and on the 1st day of October in each year. The amount to be paid by each club for semi-annual dues of its members shall be based on the actual number of members on its rolls at the semi-annual due date preceding the date of its election; subsequent semi-annual payments to be for the actual number of members on its rolls at such semi-annual due dates. Any member whose yearly dues or assessments shall remain unpaid for thirty days after they shall have become due, or shall have been imposed, shall be notified by the secretary that unless such arrears shall be paid within fifteen days thereafter, their membership shall be terminated."

James E. Woodbridge, late of the Pratt & Whitney Company, of Hartford, has been chosen general manager of the Pan-American Motor Company, Mamaroneck, N. Y. The company has bought all the machinery of the Automobile Company of America, Marion, N. J., but has not yet decided upon a factory location.

.COMMUNICATIONS..

reezing Solution Note—Neu- :ation of Free Acid in Com- ercial Calcium Chloride.

IORSELESS AGE:

nber of automobilists have com- that the use of calcium chloride the tanks, pipes, etc. This differs results of my experiments on the : this salt on the metals commonly d from the practical results ob- y others, and must be due to the of free acid in some of the com- calcium chloride. To neutralize acid it has been suggested that oda or other alkali be added. This to two serious objections. If the :re exactly neutralized, sodium (common salt) would be formed oduced into the solution in pro- to the amount of free acid present, rould be undesirable. If soda in vere added, lime would be precip- id sodium chloride introduced into tion in proportion to the soda add- : rational neutralizer, to my mind, e a handful or two of lime, slaked ıked. Lime is comparatively in- in water, and would combine di- ith any free acid present, forming chloride, slightly increasing the of the solution in proportion to acid present.

H. C. BABBITT,

, East Pittsburg Gas Works, East sburg, Pa.

nproved Method of Cylinder Head Packing.

rwOOD, N. J., December 16, 1902.
HORSELESS AGE:

ıtly many complaints have been ıbout difficulties in packing the heads of engines used in several ɔwn automobiles. Such complaints dly just. Failure through blowing :ylinder head gaskets need not oc- ıe job has been properly executed, icism of constructions necessitating cking tends to prejudice the pros- purchaser against machines other- merit. Lack of knowledge of what ı "out on the road" has led many ;hly practical constructors, design- . shop men into making mistakes, ıre recognized as such only by the ınd operators. Since such is the behooves the shop man to come l with a little advice to the just as eaning, but not quite as mechanic- ained man "behind the wheel," g to a method of putting in gaskets has proven very efficient and which n practiced in many shops through- : country.

The sheet packing, commonly known as "Kearsarge" brand, an asbestos-rubber composition with an intermediate layer of wire netting, already incorporated into the packing, has been the most satisfactory medium for securing permanent cylinder head packing. Single thickness is preferable to double.

The order of operations in packing a cylinder head would be about as follows (the gasket is supposed to be in readiness):

Scrape flat packing surfaces on the cylinder head, as well as on the cylinder end, with a putty knife or similar piece of flat steel until all particles of the old packing, soot and dirt have been removed. It is very essential to remove all traces of oil. If gasoline is employed for this purpose, care should be had to do this so thoroughly that no thin film of diluted oil remains spread over the packing surfaces. As a safeguard it is advisable to follow up the gasoline wash with one of wood alcohol.

Coat the flat packing surfaces on cylinder end and head with a layer of yellow shellac dissolved in alcohol, using a paint brush for this purpose. When it does not "stick" to the touch of the hand any more put on a second coat of shellac. Wash the gasket well with wood alcohol, removing all trace of soapstone and grease.

Between the first and second coat to the cylinder surfaces the gasket has applied one painting with the same shellac solution. After the second coat to the engine parts the second coating is applied to the gasket also.

If openings are to be cut into the gasket for water circulation or for ports, especial care must be taken to cut these openings in the gasket about three-thirty-seconds of an inch larger all around, because the packing, upon being compressed by the studs will become larger, "grow," as it were, and protrude with its edges into the apertures referred to, and, if some of these communicate with the combustion space, self ignition will often occur after a short time, owing to ragged portions of the packing becoming incandescent and remaining so for a long time.

The gasket may now be placed over the studs upon the cylinder end, and the head over the studs upon the gasket. Screw up all nuts evenly in rotation, little by little, giving each one a few turns until it "draws," going to the next one and keeping this process up until all nuts are known to be equally and sufficiently tight to permit of starting engine. Of many other jobs, which cannot be hurried and give good results, the screwing down of a packed head is one. The packing material needs time to be compressed and accommodate itself to the new conditions. If the drawing up of nuts is done slowly, it is surprising to note how often one can return to a nut and take up just about a quarter turn after it was believed to be "home" as far as it would go.

The engine may now be started up. When cylinder and head are well warmed up, after running for about half an hour, go around the entire set of studs and again draw up the nuts. Nearly in every instance the total amount of taking up which can now be done will be found to aggregate almost one entire turn of each nut. Do this gradually, as described above. After several hours' running it is advisable to go around the nuts again, repeating this operation during the next few days after putting in a new packing. A cylinder head, packed in the manner described, will remain "tight" for many months. The process described may not be a very rapid one, but it is certain to give good results and obviate repacking for a long time. It will also lessen complaints about heads which do not "stay" packed.

A. W. KING, M. E.

Troubles versus No Troubles.

Editor HORSELESS AGE:

There appears to be an idea among certain automobilists that I am a confirmed pessimist on the subject of horseless carriages, although I have three automobiles in my stable, all in working order, and kept so regardless of cost. I refrain from giving exact figures because I do not want to shock those other clever men whose only apparent expense is for matches with which they light the burners of steam machines, while the gasoline ones seem to be operated entirely free of cost.

Your correspondent, Mr. Cummings, certainly has excellent luck. I will not even insinuate that I think he does not set down his troubles in the right column. Some owners of horseless carriages always say they never have trouble, even if you meet them crawling through mud while hunting some difficulty under the carriage. They like it.

I certainly should like to meet an automobile with the excellent character Mr. Cummings gives his machine. I've been out in many carriages, including a lot that were being demonstrated by young men "from the factory," who put the machinery through all kinds of stunts. Yet I do not remember of ever riding in a carriage that the operator considered all right. Either the clutches slipped, or the spark plugs were dirty, or else the burners did not work perfectly. Gradually it sort of dawned upon me that if the experts did not keep the machines in fine shape there must be many difficulties in the way of attaining that state. Still, Mr. Cummings hasn't any troubles.

There are about fifty automobiles in this city, but as soon as cold weather starts in all but mine are stowed away, because the owners do not think they are fit to be used on rough roads. Mine are kept in commission, and they are used whenever I want to take them out, regardless of the condition of the roads or sky. I shouldn't wonder a bit if a portion of my troubles can be laid to a determination to employ

the automobiles at any time. That sort of use is the kind the machines must stand if they are to be expected to supplant horses, which I assume is the idea held by thousands of people.

I have talked with several hundred automobilists, and about every man in a measure coincides with my notion regarding cost, especially those who make real use of the machines. Of course, where a carriage is kept as a curiosity, with little use, it will not eat up much cash. I do not include such machines in my estimate. I talk about automobiles that are used as horses might be employed by folks who expected to get out into the open air about every day.

I imagine that my machines are often forced beyond what it would be best to limit them to, and yet I have never tried to run them when I would not have taken out horses. The test may be severe, but the machine that is going to survive must be more than equal to any use I may see fit to give it.

Speaking of troubles—my favorite topic, evidently—I have just had a letter from a Western physician, who has had a carriage similar to mine for about two years. The letter opens by saying that the writer has never met with so many mishaps as I have related. Yet the letter ends with a list of the parts that have broken, ranging from a crank shaft to the front axle. The doctor says repairs have been slight, for he makes them himself, even putting in a new spring to the exhaust valve. If a broken crank shaft is not serious, I am anxious to know something that is. I never broke one, anyhow. Then let the front axle snap off while going 18 miles an hour, as the doctor was traveling. Isn't that something to jar you a bit? Of course, but I do not suppose a little thing of that sort is real trouble. I once lost off a rear wheel, and I am willing to admit that it was both troublesome and costly. The doctor's chains gave out, and spark rods snapped off occasionally. There is no use in giving a complete catalogue of his mishaps—perhaps, because he did not write them. We unfortunates who were not born under a lucky star, and yet bought automobiles, can kind of imagine a few things.

Another of your correspondents, with a steam machine, opened by saying that he had little bother, and then gives a long list of what he had to accomplish to keep running six months. There was enough to eat up a fair salary.

The mere fact that I now own three automobiles and am looking for a fourth should be sufficient evidence that I am sincere in my liking for the horseless carriage. Yet I cannot allow myself to be blinded to the many and radical faults they possess, and the great cost of operating them if the new method of locomotion is to be taken seriously. If the present automobile is to be regarded as a thing to use simply for pleasure, without regard to utility, then I am willing to admit that it accomplishes what the makers expect. I haven't any such notion, however, and so I shall continue to write on the subject from the standpoint of a user who wants to have the motor wagon supplant horses for all occasions. I think there are many others who have similar ideas. When will they be satisfied?

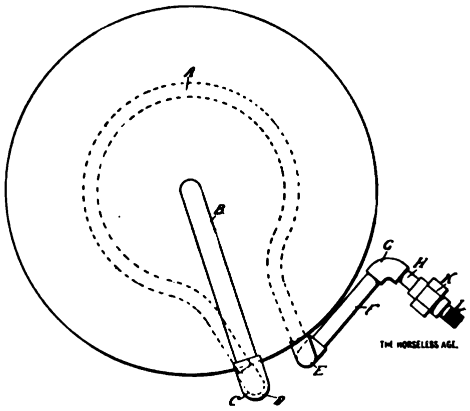
At this season of the year the automobile is a great convenience, because it can be left standing without fear of running away or of suffering from the cold—at least, gasoline and electrics can be left. I use mine a great deal in winter, especially in going about the city, seldom employing a horse, for the animal means a man to hold him. With the motor wagon I can go out alone and make as long calls as I care to without worrying over a shivering beast. The other morning I was out when the thermometer registered 14 degrees below zero, and did not have the least difficulty in getting around with either electric or gasoline. Slow speed was the rule, for the cold snow hugged the rubber tires rather tightly.

ROBIN DAMON.

A Form of Superheating Coil.

Editor HORSELESS AGE:

Having noted an article in THE HORSELESS AGE of December 10 in regard to superheating, will say that we are using a superheating coil in our carriage, and that it is giving us perfect satisfaction. We attached the coil on the outside of the boiler, as shown by the enclosed rough



A, coil of ⅜ inch copper pipe arranged over the burner; B, ½ inch brass pipe on top of the boiler; C, ½x⅜ inch elbow on each end of the coil to connect the brass pipe running up the side of the boiler, which is covered with asbestos cement about an inch deep; D, ½ inch union in the brass pipe; E, globe valve in brass pipe half way up; F, ½ inch brass pipe; G, ½ inch elbow; H, ½ inch close nipple; K, ½ inch brass union; L, connection to return bend.

sketch. We simply run our pipe from the top of the boiler to one side, down to the burner, around on top of the burner, up the side close to the other pipe, and then with elbows and union connect to return bend and throttle. There is a large saving in water and gasoline. We go over 30 miles on 25 gallons of water and 12 to 14 miles on 1 gallon of gasoline, with two persons and carriage weighing 1,000 pounds. One important thing to observe in steaming up is that the fire must not be forced so as to get the coil red hot. Have a little fire, and when steam rises open the throttle so as to let steam into the coil, thus keeping it from getting hot.

There is a carriage here in Arlington with a superheating coil of three-eighths of an inch copper tube, the same as ours, which has run several thousand miles with no trouble at all.

Can you inform us what makes the whistle when gasoline vapor is going into the mixing tube of the burner? Some carriages whistle, while others, apparently the same, do not. WETHERBEE BROTHERS.

[The whistling must be due to the relative position of the nozzle and the mixer tube, and to the flare of the latter. If either of these was changed we believe the whistling would cease. Would like to hear from readers having encountered this trouble.—ED.]

Vehicle Statistics.

READING, Pa., December 20.

Editor HORSELESS AGE:

The matter of motor sleighs is correctly stated in your last issue, where you say that they will probably bear the same relation to motor vehicles that horse sleighs bear to horse vehicles, and some figures from census bulletin No. 241 may throw light on the subject. The total number of vehicles manufactured in 1900 was 1,607,272, which number includes 118,222 sleighs. These figures indicate that the sleigh business is but 7 per cent. of the wheeled vehicle business and therefore not a very attractive field at present. Further, the total value of these vehicles was $121,537,276, of which amount sleighs represented $2,324,600, or less than 2 per cent.

This census bulletin furnishes some other figures of interest. Of the total number of vehicles made 513,565 were four wheeled buggies for one or two persons. This number, being but one-third the total, explains why motor vehicle manufacturers give preference to two passenger carriages. The much talked of business wagon shows a total of 128,726.

In the matter of money invested, family and pleasure carriages are given a value of $51,500,000, while business, farm, Government and municipal wagons are valued at $31,500,000, so that whichever point of view we take the pleasure vehicle offers the largest market, while, if we remember that business vehicles are of widely different forms, the possible market for any one style is seen to be considerably lessened. On the other hand, the enormity of the figures should certainly furnish joy to the optimist.

When motor vehicle makers have their business properly systematized, as is the horse vehicle business today, it will be possible to produce a motor vehicle for practically the same money that a team of

harnesses and carriage can be oday, and since the maintenance less, the market will be far that, where 1,600,000 vehicles in 1900, twice that number will cessive for 1910. From these ne it will be seen that there is for capital to be invested in the business provided it is expend- roper lines. The future vehicle esigned for use the year around ot supplant the horse. It must go over American roads as they horse cannot be dispensed with, t be simple enough to be man- y and every member of the fam- a horse is driven, and without licenses and similar red tape by which free people so blindly bind their neighbors with a worse than that of the effete of Europe.

CHAS. E. DURYEA.

incoln (Mass.) Affair.

rseless Age:

g to your editorial regarding the fair, the facts in the case are like street in question is the main between Lexington and Con- tance of about 5 miles, in a very led district, there being only a o houses the entire distance, no no sidewalks, very little travel, rgely produce teams.

n of Lincoln is about half way ile south of the road. Person- ver even dreamed that Lincoln is road at all.

ctmen of this town had received , as I suppose all other town of- e, possibly justifiable, perhaps he board, however, is a doctor, lover of horses, and a corre- hater of autos. He stirred the ction and held the watch. They place on the road described way between Lexington and where the road sloped gently v. Here they placed our friend, , with his watch. Then 330 feet another man was placed with a ief, and beyond each of these er was standing with a rope, one ed to a tree on one side of the he other end all ready to be tied the opposite side. My brother g on a gasoline dos-a-dos with d two ladies on board, I follow- ehind on a motor cycle. We our estimation, going about an hour. These parties halted officious doctor announced we g 17 miles an hour.

was taking our address a yell of the outposts announced a oming. The timer pulled his n his pocket, trying to set it as ck to his line. Before he got carriage passed, and though his turned when the handkerchief given, the time was announced as about 21 miles an hour. This party was an elderly lady from Bedford, with a hired driver, one who would certainly never be looked upon as a racer.

Later another party with a gasoline machine was halted, and though he was running on the low gear, having been warned, his time was taken as 16¼ miles per hour.

These people had passed an ordinance of 8 miles maximum, to be reduced to 3 miles on passing teams, but for some reason they decided they could not hold anyone on it, and so held all parties to the State law. The judge knew his business well, as the fine of $50 each attests. The low gear man was given the benefit of a doubt, whatever that may mean, as the same evidence applied to all cases, namely, the doctor's stop watch and his word that the timing was accurate.

However, if it was correct, it certainly proves that if autoists are to be held to the strict letter of the law, whether it be up or down hill, in the city or country, the legal rate of 15 miles should be raised to 20 at least for open country. If horse drawn vehicles were looked at the same way and their owners timed over favorable stretches, it would be only luck that would save the most of them.

Yours for more equitable laws,

W. E. SMITH.

[We are entirely in accord with our correspondent's view as expressed in the last paragraph.—ED.]

Superheating Coils.

Editor HORSELESS AGE:

I note the remarks upon superheating by A. S. Putnam in your issue of December 17 and would say that my experience does not agree with his views. I have been through the superheating question, both as applied in marine practice and to carriages, and have found a decided gain.

Superheating coils on carriages have given 3,000 miles service and show no signs of burning out, and this in a hilly section, where the fire will be on full blast after the throttle is closed and the coil comparatively dry. The addition of the superheating coil and more area in the feed water heater enabled a dos a dos carrying 220 pounds steam pressure to change in economy from 8.5 to 10.2 miles per gallon of gasoline consumed in a hilly country having fair roads. The usual cloud of exhaust steam was absent after the engine had made ten or fifteen revolutions.

The area of the feed water heating surface was increased by the addition of 8 feet of one-quarter inch (iron pipe size) copper tubing, which was coiled flat and placed on top of the boiler, receiving its water from the coil in the muffler and delivering to the boiler through a tube running down from the top of the boiler to within 4 inches of the crown sheet. This tube was drilled full of one-thirty-second inch holes and the bottom was closed, making the delivery of the water a finely divided spray.

We have repeatedly tested this wagon for economy, and have always found our results to prove the advantages of superheating.

The subject of lubrication was solved by attaching a mechanical oil pump, which has never failed to work and pumps heavy cylinder oil without difficulty.

On the subject of kerosene my experience has demonstrated that with a supply of oil of a known test it is very satisfactory, but since it is impossible to obtain the same test twice it becomes a nuisance, due to the inability of the burner to adjust itself to the change of the oil, a deposit of soot on the tubes of the boiler being the result.

WM. E. S. DYER.

The Automobile in a Dakota Physician's Use.

Editor HORSELESS AGE:

I have been using a heavy gasoline automobile in my practice here for two years. We have prairie roads only, and there is not another automobile within 50 miles around. I experience very little trouble, and none to compare with what some write about in your paper; I have read THE HORSELESS AGE for two years.

During the first Dakota blizzard we had this year, in November, I made a trip to the county seat, about 10 miles north. A heavy head wind was blowing and snow falling; in fact, it was a good, hard Dakota blizzard. During the home trip I had the wind and storm at my back, and had the top up. I made the return trip in twenty-two minutes, and often I went through snow drifts which went up to the hubs. We have no speed laws in this vicinity, and if I could make a mile a minute no one would kick. During the two years that I have operated my automobile I have never scared a horse so as to cause any damage. I think that if some of the light machines should try to follow me they would soon go to pieces.

A. F. CLOUGH.

Montana Man Looking for an Agency.

GREAT FALLS, Mon.

Editor HORSELESS AGE:

Such experience as I have had leads me to believe that there is a great future for automobile traffic, even in this rough and rugged part of the country. Incidental to our proximity to the mountains, and while I see the principal agitation in the East at present is for an ideal road surface for the machine to travel on, my desire is to get in touch with the builder who is taking the road conditions as he finds them and putting up an article to meet those conditions.

I delivered a 6 horse power gasoline runabout for a purchaser this fall at Lewistown, Mon., a distance of 110 miles, over a route which would doubly discount any of the endurance run routes that I have seen described, as a large portion of the distance one is climbing anything up to 24 per cent. and falling down on the other

side; and at that there was no trouble with the rig. It has been a source of surprise to me to read of so many failures in the endurance runs of prominent machines. Is it the man or the machine that is at fault? It seems to me it must be mainly the former.

I have had considerable experience with internal combustion motors, both four and two cycle, and I will say that I have a very kindly feeling for and expect to see a radical change in the status of the two cycle in automobile matters.

I have been thinking for some time to engage to a certain extent in the introduction of the automobile into this part of the country, both the pleasure and commercial class. If you know of a progressive builder who cares particularly for the quality and general adaptability of his machines and who desires to have a representative in a country comprising in some parts hills as steep as can be regularly traveled with a horse, and the balance of the roads quite good enough for a well built machine—a representative who can go at the line understandingly as a mechanical engineer, why, please refer him to the undersigned. B. D. WHITTEN.

Automobile Locks.

Editor HORSELESS AGE:

How can an automobile be locked so that it cannot be tampered with while a physician is attending to a patient?

ANNOYED M. D.

[It can only be locked to prevent starting while the operator is away. The method of doing this depends upon the motive power. Electric vehicles are usually provided with a plug in the motor circuit, which can be withdrawn and carried in the vest pocket and then the operation of the controller lever has absolutely no effect. Steam machines often have an auxiliary throttle valve, which can be closed and the operating hand wheel taken off and carried along. In gasoline machines the igniter circuit is broken by means of a plug carried in the pocket, as in electric vehicles, or else by means of a simple switch located in a locked compartment.—ED.]

Fuel Queries.

Editor HORSELESS AGE:

Kindly tell me through your paper what is the difference between 76° and 88° gasoline, and which is the best for a steam carriage?

Is there not an oil burner which atomizes the oil? If so, why is it not in more common use? I understand that the danger of carbon deposits is the reason which at present keeps most manufacturers from using the heavier oils. In using the oil in the form of a spray, it seems to me there would be no danger of carbon being deposited around the openings.

A CONSTANT READER.

[The difference between 76° and 88° gasoline is that the latter is much more volatile, and in consequence much more dangerous. In fact, it can hardly be recommended for use for this very reason, except, perhaps, during periods of extremely low temperature. The higher grade gasoline contains less carbon, and is therefore less likely to give trouble from deposits; but with the burner properly constructed the 76° should not give any bother in this respect.

Spraying oil burners are used on locomotives and in stationary plants, but never on automobiles, owing to the noise which accompanies their operation, and also to the fact that they are too cumbersome.—ED.]

Contact Point Material.

Editor HORSELESS AGE:

Will you please tell me in your paper what is the best material for contact points for the vibrator on a coil?

H. H. HOOPER.

[Hard platinum.—ED.]

In the Market for a Motor Truck.

COLUMBIA CITY, Ore.

Editor HORSELESS AGE:

I am in the field for the purchase of a steam truck, something after the style of the Cunningham truck, described and illustrated in THE HORSELESS AGE about a year ago. I am confident that there would be a great demand for such trucks in the lumbering business here. E. McVEY.

A Simple Method of Testing Engines.

The American Automobile and Storage Company, of West Sixtieth street, have a simple and effective method of testing engines which have been repaired or overhauled, and one which is said to be of great value in insuring the production of good work. The driving wheels of the vehicle to be tested are placed on rollers, two to each wheel, and the motor is started and gradually brought up to speed. A speedometer, connected with the rollers by belt and pulleys, indicates during the test the rate which would be attained were the carriage running on the road with the motor at a like speed. "Hill climbing" tests of any desired severity can be effectively made by the application of a powerful brake actuated by a hand lever. Every motor on which work is done is given a run on this apparatus before being sent out, and troubles which would otherwise appear only when on the road are brought to light and remedied.

Another interesting feature at this station is an hydraulic lift for removing batteries from electric broughams. This labor saving device is said to be the only one of its kind in the city.

The American Automobile and Storage Company's station may be called the home of the Oldsmob[illegible] being said that some 650 of these machines are stored and cared for there, in addition to many electric carriages and gasoline vehicles of other makes. The station contains, besides a very completely equipped machine shop, a body shop, where complete new bodies of any style can be built; large storerooms for parts for renewals, of which a very com-

plete stock is carried; a tire room; charging stations for electric vehicles; lockers for owners and chauffeurs; washing stands and all the various requisites for storing, handling and repairing automobiles of all kinds.

NEW VEHICLES AND PARTS.

The Double Tube Fisk Detachable Vehicle Tire.

The Fisk Rubber Company have brought out what they call their double tube Fisk detachable vehicle tire, in which the entire air space is wholly above not only the rim but also the entire clamping devices, thereby securing maximum action in the tire, as no portion of the air chamber is in any way confined. They furnish us the following description:

The method of attaching used is entirely new. It does not depend upon the air pressure to hold the tire onto the rim and cannot blow off from or creep on the rim until the clamping bolts have been removed. The tire is attached to a perfectly flat rim which simplifies matters materially, both to the wheel manufacturer and the maker of automobiles. The design of the tire is such that the base or the beads are held in such a position that the inner tube cannot be pinched. The rings which hold the tires in place have an inside angle surface and the tire is so designed that the beads play the part of an inside cone wedge, serving two purposes: (1) of clamping the beads together, and (2) of locking the base of the tire firmly to the rim and thereby preventing all danger of creeping. By the use of this method of attaching, the

ty of using any heavy prying tools
e away with, and anyone who can
ordinary S wrench can attach and
any size tire with no exertion what-
id in a very few minutes.
method of manufacture is such that
ter case when off the rim assumes
ie position as when attached, which
the operator to insert the inner
ithout fear of its being misplaced,

FISK DETACHABLE TIRE.

or wrinkled while the tire is being
l.
clamping bolts are designed with a
d washer and check nut, removing
all liability of their working loose.
naterial is identical with that used
vell known Fisk single tube tire, in-
the Fisk automobile fabric. The
ully protected by domestic and for-
tents.

ie "Union" Automobile.

dium weight gasoline automobile
iness or pleasure purposes is just
rought out by the Union Automo-
mpany, of Union City, Ind. The

FIG. 1.—THE UNION AUTOMOBILE.

FIG. 2.—UNION AUTOMOBILE ENGINE.

this company is principally owned
Buckeye Manufacturing Company,
turers of parts of carriages and
and the Lambert Gas and Gaso-
gine Company, Anderson, Ind.
icle is built as a two passenger
with a collapsible front seat,
nables it to be converted into a
senger car.
ngine is an 8 horse power, four cycle, double opposed cylinder machine, shown in Fig. 2 herewith. The crank is a double throw, which insures that the explosions are equally spaced and the reciprocating parts very completely balanced. Either jump spark or touch spark igniters are fitted, the engine shown in the cut being fitted with touch spark igniter.

A friction disk change speed gear is employed, the flywheel of the engine, which constitutes the disk of the transmission, being covered with a composition plate of metals having special friction qualities. The friction wheel bears directly against the face of this disk and is provided with a filling of paper or friction board; it is controlled by a pedal ratchet. The shaft which carries this friction wheel is placed parallel with the centre of the friction plate on the flywheel and the friction wheel is moved in either direction on the shaft by means of a controlling lever.

The gasoline tank is built in the back of the seat, completely hidden from view, and can be removed without removing the upholstery. It has a capacity sufficient for a run of 125 miles. The engine is water cooled, but only a small amount of cooling water needs to be carried, as a rotary circulating pump, driven by gear from the cam shaft, and a large radiator coil are provided.

The electric current for ignition is supplied by a dry battery—in starting and by a magneto in normal operation. The magneto is placed in position with its friction pulley in contact with the rim of the motor flywheel, in which position it is easily accessible. The dry batteries are located in a secure position under the seat. The carriage has a wheel base of 72 inches and a standard tread. The steel artillery pattern wheels have a diameter of 34 inches, and are equipped with 3½ inch pneumatic tires. Kerosene oil lamps are furnished and enameled sheet steel mud guards are fitted. The vehicle has a special band brake controlled by the left foot, and the friction wheel constitutes an emergency brake, being operated by throwing it in the reverse position.

The operator controls the steering bar with his right hand and the speed changing lever with his left hand. The change in the time of the spark and speed of the engine are controlled by attachments on the controller lever, in convenient position for the left hand. By this arrangement the speed of the motor can be varied from 150 revolutions per minute to 1,500. This variation of speed of the motor, in addition to the variable speed from the transmission, allows a wide range of speed for the vehicle.

The "Autocar" Tonneau for 1903.

In the new models of the Autocar Company, Ardmore, Pa., all the good features of the late models may be found, but all those details of the 1902 machines that proved wanting have been modified and improved. Most of the principles laid down by the company when they designed their runabout have been retained. The engine, like the original one, is of the horizontal opposed cylinder, two-throw crank type. There are three brake drums, two of which are secured to the drivers, and the crown gear of the differential is of the spur variety and pinion driven, although a bevel gear drive is employed.

The only radical departures from former practice were made when the engine was placed under a bonnet in front instead of under the body proper in the rear, and when three forward speed and reverse were adopted in place of only two forward speeds as formerly.

Four distinct models are manufactured. The running gear, machinery and mechanism are identical in the various machines, the only difference being in the bodies. Model A is a tonneau carrying four passengers; Model B has a front seat, rumble and a hood; Model C has the same body and rumble, but no hood; Model D has a main seat like the former, a hood and a boot (in the rear), where parcels may be carried.

SPECIFICATIONS OF THE CHASSIS.

The wheel base is 6 feet 2½ inches, and the tread 2 inches less than standard, or 4

feet 6 inches. The wheels are of the artillery type and have fourteen spokes. They are shod with 30x3 inch "G & J" clincher pneumatics. The front wheels run on "American" roller bearings, and the rear wheels are keyed to the live shafts in the tubular rear axle. These shafts revolve in roller bearings in the spring pedestals and in roller bearings located in the hubs on either side of the casing of the balance gear. The latter is of the spur type. The frame of the vehicle, of hickory, is armored with steel straps that extend along the entire length of the sills. The springs on which the carriage rests are of the full elliptic type in the rear and of the semi-elliptic type in front. In the 1902 cars the springs of the front axle were three-quarter elliptics.

Fig. 1 shows the type of spring employed in the new machines. In principle

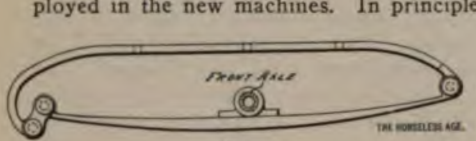


FIG. 1.

the quarter spring and shackle bracket have been united, forming a self contained piece, which is of spring steel and has but one strong leaf. Instead of resting on the

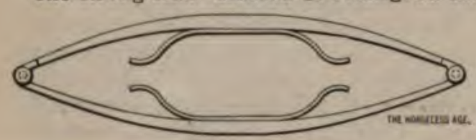


FIG. 2.

front axle the springs are hung from it to reduce the centre of gravity of the machine. The full elliptics are equipped with leaves that take the place of rubber buffers (see Fig. 2). The front springs are 32

FIG. 4.—THE AUTOCAR TONNEAU.

inches long between the eyes and the others are 36 inches. It required some experimenting on the part of the manufacturers to determine what thicknesses of leaves give the best results. The tonneau must ride well with two passengers in front and not sag too much when the tonneau is occupied.

In the 1902 vehicles the motor was supported at the ends of the cylinders—i. e., the latter rested on brackets which were secured to the frame. In the new models a special frame is employed, which supports the motor and change gear box. The parallel bars of this frame are of angle iron and rest on three crosspieces of rectangular section.

The engine, rated at 10 horse power and running normally at a speed of 1,000 revolutions per minute, has a wide range of speed, viz., 250 to 1,200 turns per minute. The cylinders are disposed horizontally and are diametrically opposed, the cranks being set at 180 degrees to each other. The bore is 3¾ inches and the stroke 4 inches. A single cam actuates both exhaust valve stems, which are in line with each other midway between the centres of the cylinders. In contrast to conventional practice the engine has two flywheels, one of which constitutes a member of the driving clutch mechanism. The exhaust pipes are not united and have no elbows in them, but only bends of a large radius. Steel cycle tubing is employed to conduct the gases to the muffler. The carburetor, which is of the float speed spraying type, is connected to a fitting having branches to each cylinder. Formerly the circulating pump was friction driven "off" the flywheel. In the new cars the pump is driven positively by means of a chain.

The radiator is of generous proportions, the tubes, over 2 feet in length and twelve in all, being disposed in six double rows. Both disks and tubing are of copper. As soon as a radiator has been assembled it is dipped into a bath and tinned.

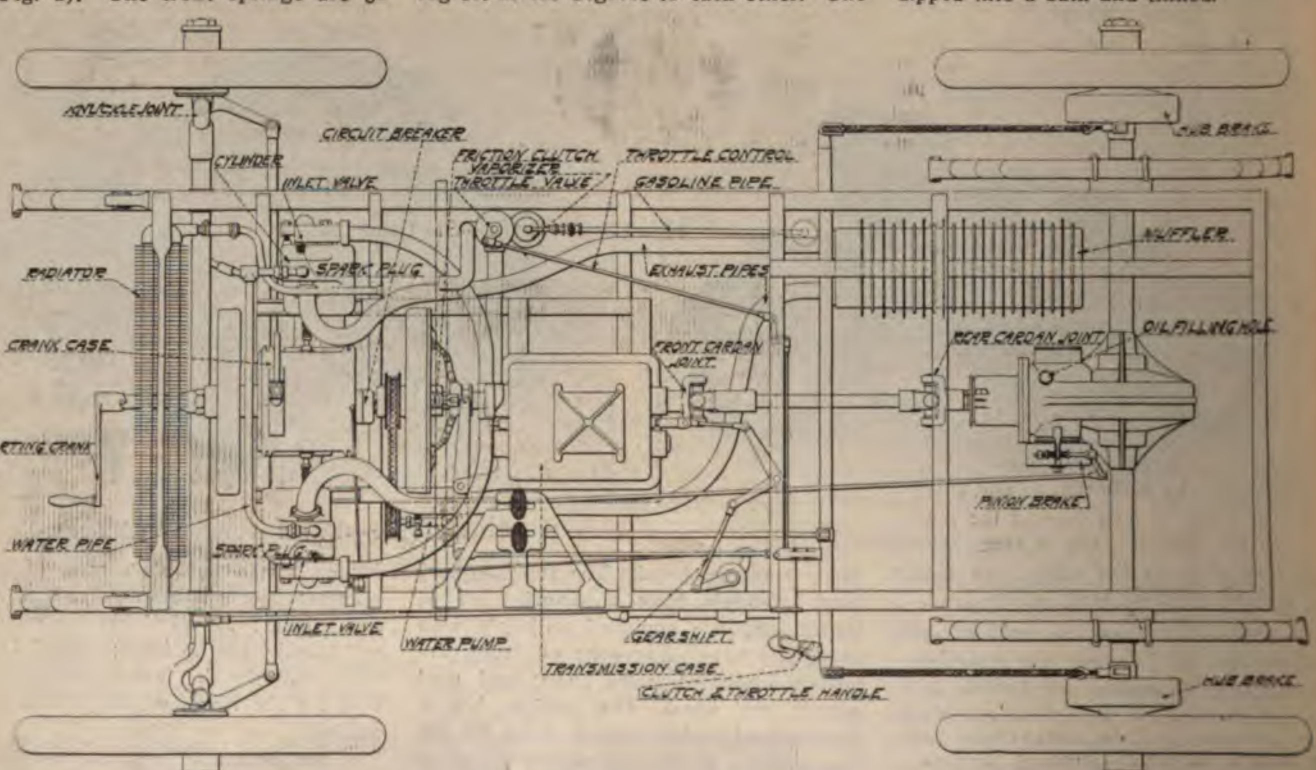


FIG 3.—PLAN OF AUTOCAR TONNEAU.

The water tank is of copper, and is so secured to the dash that it is covered by the bonnet. Its capacity is 5 gallons, which is said to be enough for a 200 mile run. The reservoir which contains the lubricating oil is fastened to the water tank. A system of copper tubing conducts the lubricant to the various bearings, and bolted to the dash is an oil pump to force oil into the crank chamber, which is accomplished without the driver leaving the seat.

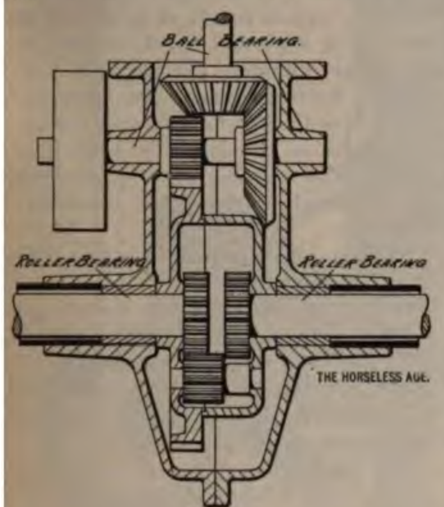


FIG. 5.

In the design of the clutch a number of changes have been made. A description of it will be published in THE HORSELESS AGE as soon as a patent is granted.

The variable speed gear is of the sliding gear type, with direct drive on the high gear, and three speeds, 6.8, 14 and 23 miles per hour, and a reverse—5 miles per hour. Like the crank case of the engine the gear base is of aluminoid. A flexible shaft, with self oiling universal joints, transmits the power to a bevel gear driven countershaft, to which is keyed the spur gear pinion that drives the drum of the differential. To prevent the universal joints from heating, the crosses, which are of bronze, are recessed so that a quantity of grease can be forced into them. Special caps are provided to keep the lubricant from working out. The diagrammatic sketch (Fig. 5) illustrates the construction of the rear drive mechanism, and is self explanatory. To the countershaft mentioned above a pulley is keyed constituting the drum of the emergency brake.

The muffler is built up out of castings and perforated sheet metal plates securely held together by bolts that extend through it. The plates project beyond the muffler to increase the radiating surface. Under the front seat on the right hand side is located the gasoline tank, which holds 10 gallons of fuel. Adjoining the tank is the box which contains the battery. The latter is composed of six Columbia dry cells, three of which are in use at a time.

The control devices consist of a crank by means of which steering is done, a lever which controls the gears, a spark timing thumb lever, a combined throttle and clutch control lever and the brake pedals.

The steering crank is secured to a vertical standard to which is keyed the pinion that meshes with the rack of the main steering link. The lever that controls the sliding train of gears is brazed to a tube that embraces the steering post. The little thumb lever has a shaft that adjoins the standard. The clutch lever might be termed a panel lever owing to its location. Pushing it forward throws the clutch in and pulling it back relieves the clutch. By twisting the grip the mixture is throttled. One of the foot pedals applies the expanding ring brakes of the driving wheels. A cable causes both rings to bind at the same time. The other pedal applies the emergency brake on the countershaft in the rear, and has a latch and quadrant to hold it in position.

Each cylinder has a Splitdorf coil with vibrator. Both of them are located in a box secured to the dash. A novelty is a small hand pump which is now being used to inject a charge into the main inlet pipe instead of the rubber bulb which formerly served this purpose.

The weight of the complete machine with tonneau body is 1,460 pounds. The manufacturers claim that all parts are interchangeable.

Two New St. Louis Models.

Fig. 1 herewith shows the new tonneau model of the St. Louis Motor Carriage Company. This vehicle is equipped with an 18 horse power double cylinder engine located under the bonnet in front. The motor runs at a normal speed of 750 revolutions per minute, and enjoys jump spark ignition. The flywheel is located on the rear side of the motor and forms a part of the friction clutch. The vehicle has a sliding gear transmission, giving three forward speeds and one reverse, and operated by a single lever, with a patented clutch locking device. Two sets of double acting brakes are provided. The brake on the forward sprocket comprises two wood shoes acting on the outside of the brake drum, and the brakes acting directly on the rear wheels comprise two wood shoes acting on the internal surface of the drum.

The vehicle is hung on very long, easy riding springs, and the riding qualities are further enhanced by the long wheel base —8 feet. The wheels are of the artillery wood pattern, 32 inches in diameter, with 4 inch pneumatic tires. The wheel steering is a very simple design, employing a rack and pinion. The total weight of the machine is 2,250 pounds. Fig. 2 illustrates the runabout.

FIG. 1.—ST. LOUIS TONNEAU.

FIG. 2.—ST. LOUIS RUNABOUT.

The Flint Gasoline Roadster.

The Flint Automobile Company, Flint, Mich., have just brought out a 1,000 pound gasoline vehicle, an illustration of which appears herewith. The vehicle has a reachless gear with wire wheels 28 inches in diameter, shod with 2½ inch single tube tires. The rear axle is a live axle, surrounded by a 2 inch No. 10 gauge cold drawn steel tube with a strong truss over the differential gear. The latter is of the Brown & Lipe spur type and is provided with a 2x10 inch brake surface. The front axle is also tubular, of 1¾ inch diameter and No. 10 gauge. One-half inch ball bearings are used throughout. The springs are three-quarter elliptic. The gear frame is made of 2½x⅜ inch angle steel in a single piece, with corners bent and ends brazed. The gauge is standard and the wheel base 72 inches.

The engine is rated at 8 horse power and runs at a normal speed of 750 revolutions per minute. Spiral gears are employed to drive the cam shaft. The engine is water cooled, circulation being effected through a radiating coil by means of a rotary pump.

A Champion transmission gear is used, which gives two speeds ahead and one reverse, and together with the engine control admits of continuous variation of speed between the limits of 6 and 30 miles per hour. The gear is controlled by a single lever. The power is transmitted to the rear axle by a half-inch Baldwin roller chain of 1 inch pitch.

The gasoline and water tanks are made of 22 gauge galvanized iron with seams and ends rolled, riveted and soldered. The capacity of the tanks is said to be sufficient for a run of 125 miles. Side steering is used. The body is spacious, has extra heavy sills and panels and is claimed to be of the best carriage workmanship. The entire front of the body is made into a locker suitable for the clothing of the tourist or the medicine cases of a physician. The body is entirely independent of the machinery and can be removed by loosening four bolts.

THE FLINT ROADSTER.

The Reber Gasoline Touring Car.

The Reber Manufacturing Company, of Reading, Pa., recently brought out a medium weight gasoline touring car, illustrations of which are shown herewith. The car is the design of James G. Heaslet, formerly mechanical engineer of the Autocar Company. The company occupies the old Acme Manufacturing Company's plant, formerly operated by the American Bicycle Company.

The body is of the removable tonneau type, and the total weight of the car is 1,650 pounds. The wheel base is 78 inches and the gauge 54 inches.

The vehicle is equipped with a double cylinder, vertical engine of 12 horse power, running at a normal speed of 1,000 revolutions per minute. The motor is located in front under a bonnet. The speed of the motor is controlled by a throttle governor. The water is circulated by a centrifugal pump. The working parts of the engine are completely enclosed and run in an oil bath.

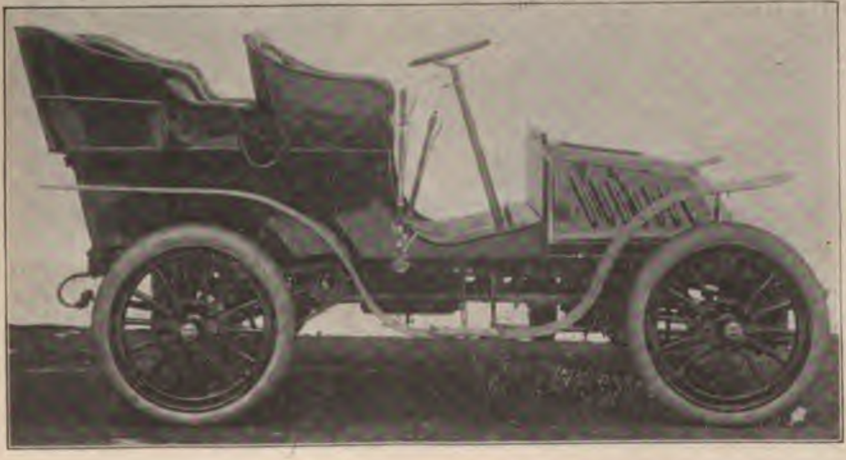
The transmission gear is of the shifting type and gives three speeds ahead and one reverse. The design is such that the gears can be readily removed without disturbing the case. The power is transmitted to the rear wheels by double chains. The lubrication of all parts is positive, and ready access may be had for inspection.

The vehicle has a trussed frame, which is supported on semi-elliptic springs. The axles have ball bearings, and are provided with 30 inch wood wheels. A foot brake acts on the differential and an emergency brake directly on the rear wheels; both brakes are double acting, and the operating mechanism is designed to unclutch the engine before the brakes are applied. The vehicle is equipped with positive wheel steering, and brass trimmings are used.

The White Steam Delivery Wagon.

We give herewith an illustration of the White steam delivery wagon, two of which participated in the recent 500 mile Endurance Contest, making excellent records.

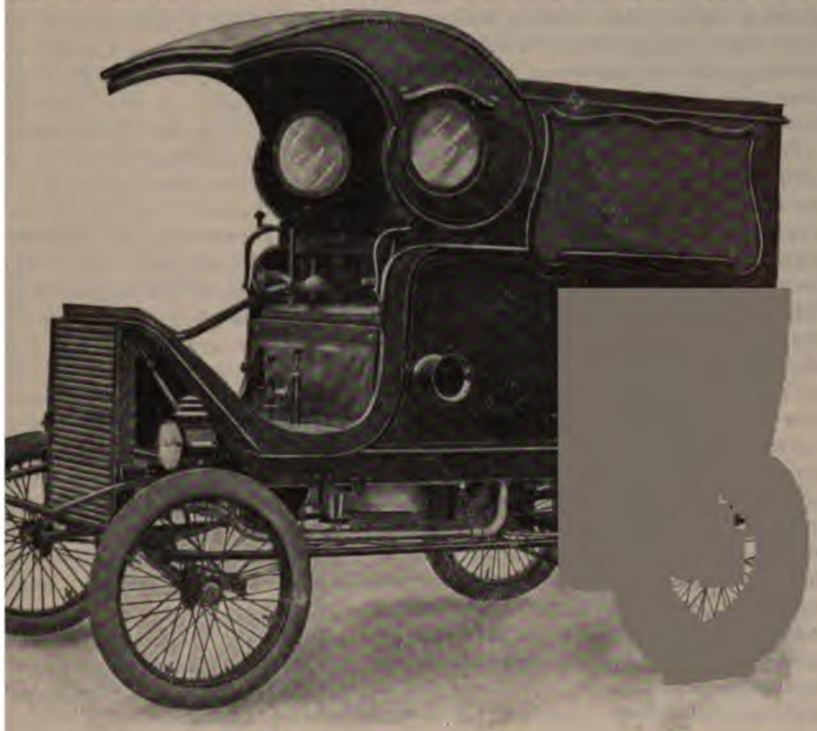
This delivery wagon is intended particularly for the light retail trade, such as dry goods, laundry, mail service and small parcels of all kinds, the total load, aside



REBER GASOLINE CAR—SIDE VIEW.

FRONT VIEW.

:iver, not to exceed 500 pounds. weight of the wagon is 1,700 'he carrying space in the body s long by 44 inches in height by ı width, and its height is divided re by a rack, which can be re- desired. The wheels are 30 iameter and are fitted with 3½



THE WHITE STEAM DELIVERY WAGON.

er tires. The wheel base is 6 :s; the tread is 54½ inches, and clearance from the dust caps :els is 60 inches. The car is 9 es in length over all. The en- eam generator are the same as pany's regular stanhope; the ar- being different, the engine be- the generator, and of the latest :ased engine. All these cars are ith condenser, in order to avoid ance of steam in the crowded e they are certain to be used.

'estfield Running Gears.

ion to its Westfield steam car- :. J. Moore Manufacturing Com- :ructs for the market running automobile bodies. A running gear with body, minus machinery, is illustrated in Fig. 1. It is referred to by the manufacturers as their Model G-2 French pattern light car. The wheel base is 72 inches; tread, 52 inches, and wheels, either wood or wire, 30x3 inches. The gear has a reinforced, tubular, straight front axle and a live rear axle, with a one-half inch tube over it, and a 1⅛ inch truss. Both front and rear axles are of nickel steel, 1⅛ inches in diameter. The equalizing gear on the rear axle is provided with a single brake band and a thirty tooth sprocket for a 1¼ inch pitch, ⅜ inch roller chain. The gear is fitted with inclined wheel steering. As will be seen, the body is provided with a bonnet in front, under which a horizontal motor may be placed. If this is the arrangement adopted, the seat of the body remains free for luggage.

Fig. 2 represents a running gear for touring cars, without body. This running gear has an 82 inch wheel base, 52 inch tread and 32x3½ inch wheels of the wood artillery pattern, with bronze caps. The front axle is a solid drop of 1¼ inches diameter. The steering connection is in front of the axle, which gives a clear space for the motor. The rear axle main tubes are 2 inches, with a 1¼ inch truss tube and braces reaching the full width of the axle, sustaining the load very close to the hubs. Both front and rear axles have steel spring blocks brazed to them, with spring clips running round the axles. The front springs are hung in front by a solid connection, insuring perfect steering; at rear, with link joints. The rear springs are hung with links at both ends, with heavy lugs and adjusting rods for controlling axle by connection to frame.

The body frame is of 1½ inch 10 gauge weldless steel tube, with four cross tubes with reinforced brazed joints. This gear is fitted with wheel steering on either side of direct or worm pattern, and steering wheel post raises to a vertical position for dismounting of the driver, being held in position by a bronze bracket, with adjustable bearings, every steering joint having a taper adjustment.

The rear wheel hubs are fitted with brake drums on the inside of the wheel, 9 inches in diameter, 1½ inches face, held in place by flange and bolts.

The Brownlow Bill.

(CONDENSED.)

Be it enacted by the Senate and House of Representatives that there shall be in the Department of Agriculture a bureau to be known as the Bureau of Public Roads.

That the object of said bureau shall be to co-operate in the building and improvement of the public roads, under the direction of the director of said bureau, in such States and districts in the United States as shall be determined upon by said director. The general policy of such bureau shall be to bring about a uniform system of taxation for road purposes and a uniform method of road construction, repair and maintenance throughout the United States, and to co-operate with any State or subdivision thereof in the actual construction of permanent highways.

That there shall be appropriated for the maintenance of said bureau and the use thereof the sum of $75,000 for salaries and for the following items: The general expenses of said bureau; to enable the director to make inquiries in regard to systems of road building and management throughout the United States; to make

FIG. 1.—WESTFIELD MODEL G 2.

FIG. 2.—WESTFIELD RUNNING GEAR.

investigations and experiments in regard to the best methods of road making and the best kinds of road making materials; to co-operate in the building of object lesson roads in the several States, in accordance with the plan hereof; to employ local and special agents, clerks, assistants and other labor required in conducting experiments and collecting, digesting, reporting, and illustrating the results of such experiments; to investigate the chemical and physical character of road materials; to purchase necessary apparatus, materials, supplies, office and laboratory fixtures; to pay freight and express charges and traveling and other necessary expenses; to prepare, publish and distribute bulletins and reports on the subject of road improvement; to enable him to instruct and assist in the building and improving of the public roads and highways in such States and districts in the United States as shall determine to follow the plans and methods determined upon by the director and to enable him to assist agricultural colleges and experiment stations in disseminating information on the subject of improved roads.

That any State or subdivision thereof may apply to the director of said bureau for co-operation in the actual construction of a permanent improvement of any public highway. Every application shall be accompanied by a properly certified resolution stating that the public interest demands the improvement of the highway described therein, but such description shall not include any portion of a highway within the boundaries of any city or incorporated village.

That the director of said bureau, upon receipt of any such application, shall investigate whether the highway is of sufficient public importance to come within the purposes of this act, taking into account the use, location and value of such highway or section thereof for the purposes of common traffic and travel, and for the rural free delivery of mail, and after such investigation shall certify his approval or disapproval of such application.

That if the director of said bureau shall approve such application, he shall cause the highway to be mapped, both in outline and profile. The improved or permanent roadway of all highways so improved shall not be less than 8 nor more than 24 feet in width, unless for special reasons it is required that it shall be of greater width. He shall, if requested by the application, include provisions for steel plate or other flat rail construction in double track.

That upon the completion of such maps said director shall cause an estimate to be made of the cost of construction of the road and transmit such estimate to the officer from whom the application proceeded, together with a certified copy of said maps, including a certificate of his approval of the highway.

That after the receipt thereof the official making the application may file with the director of said bureau a second application, stating that such highway so approved shall be constructed and maintained according to the provisions of this act.

That in case the boundaries of such proposed highway shall deviate from the existing highway, the officials making the application must provide for securing the requisite right of way prior to the actual commencement of the work of improvement.

That upon receipt of the application and certified copy of the resolution said director shall advertise for bids for the construction of such road, according to said plans and specifications, and shall award such contract to the lowest responsible bidder, except that he may award the contract to the State or subdivision thereof making the application, and except that no contract shall be awarded at a greater sum than the estimate.

That one-half of the expenses of the construction shall be paid by the Treasurer of the United States upon the warrant of the Comptroller, and one-half of the expense shall be paid by the State or subdivision thereof making application for co-operation: Provided, That nothing herein shall be construed to prevent the State or subdivision thereof from distributing the said one-half so that the State may pay a portion, the county a portion, and the owners of the land abutting upon said road another portion: And provided further, That no money be advanced by the United States in payment of its portion of the cost of construction as provided for herein, except as the work of actual construction progresses, and in no case shall the payment or payments made thus prior to the completion of the work be in excess of 80 per centum of the value of the work performed, but in all cases 20 per centum must be held until the completion of the work according to the plans and specifications and to the satisfaction of the director of said bureau.

That for the specific purpose of carrying out the co-operation and actual construction provided for herein and for the maintenance of said bureau of public roads, there is hereby appropriated out of money in the Treasury the sum of $20,000,000: Provided, That no State shall receive in aid of road construction out of any money appropriated for that purpose according to the provision of this act a greater proportion of the total amount appropriated than its population bears to the total population of the United States.

Gordon Bennett Cup.

H. S. Harkness, Percy Owen, L. P. Moers, Cleveland, Ohio, and C. W. Matheson, Grand Rapids, Mich., are candidates for the two vacant places on the American Gordon Bennett team, Mr. Winton's application having already been accepted. It is said that Mr. Matheson is having built a racing machine with four cylinders, 8x10, designed to develop 150 horse power. W. K. Vanderbilt, Walter C. White and J. B. Hedges, of Grand Rapids, are mentioned as probable candidates.

The Paris Automobile Exhibition.

The Fifth Exhibition of Automobiles, Cycles and Sporting Goods, organized by the Automobile Club of France at the Grand Palais in the Champs Elysees, Paris, was opened auspiciously on Wednesday, December 10, by a visit of M. Loubet, President of the Republic. The Grand Palais is one of the buildings remaining from the last Universal Exposition. Specially built for exhibition purposes, spacious and located in the heart of Paris, it satisfies all the requirements of a gigantic automobile show. A plan of the building appeared in THE HORSELESS AGE of January 1, 1902. The main entrance is on the Avenue Nicholas II, and from this entrance a main aisle leads right through to another large entrance on the Avenue d'Antin. The spaces along this aisle are naturally the most desirable. These spaces were allotted by lot to leading manufacturers. Entering from the Avenue Nicholas II the first two stands on the right are those of the De Dion et Bouton, and then follow the stands of Peugeot, Gardner-Serpollet, Panhard-Levassor and Cie. des Voitures Electro-Mobiles in the order named. The first stand on the left is that of Delahaye, which is followed by Rochet-Schneider, Decauville, Dietrich, Darracq and Gillet-Forest.

The exposition comprises sixteen classes of exhibits, Class I consisting of automobiles, motor cycles and all kinds of vehicles mechanically propelled. In this class manufacturers are admitted only. Class II comprises bicycles. In Classes I and II there are 188 exhibitors and only very few of these show cycles only. In addition to French firms space is occupied by five British, four German, two Belgian and one each American, Italian, Dutch and Swiss firms, not to count exhibits of foreign manufacture, but shown by French firms.

There are also many exhibitors in most of the other classes, and every inch of space in the big building has been let.

A feature of the show, the same as of all the preceding ones, is the free lottery for which a ticket is given with every entrance ticket. The prizes for this lottery were donated by the exhibitors and comprise, among others, a Gillet-Forest 5 to horse power, two passenger vehicle, said to have a value of 6,500 francs, parts of all kinds and checks good for discounts at the manufacturers' in the purchase of vehicles.

The space was sold at the rate of [illegible] francs per square metre (46 cents per square foot) in any part of the main hall, with the exception of the spaces alongside the main aisle, for which double rates were charged. Space in other parts of the

was charged for at the rate of
; per square metre of horizontal
nd 15 francs per square metre of
ace. The profits of the show will
ed as follows: Automobile Club
e, 67 per cent.; Chambre Syndi-
Cycle et de l'Automobile, 13 per
ambre Syndicale de l'Automobile,
ent.; Syndicat des Fabricants de
per cent.
iow is open every day (Sundays
from 10 a. m. to 6 p. m. The
i is one france (20 cents) a per-
:ept on Friday, when it is 3

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e opening day, Wednesday, De-
10, President Loubet arrived at
id Palais shortly after 10 a. m.,
ied by a number of high Govern-
cials. He was received at the en-
the Ministers of Commerce and
ilture and by the exhibition com-
A "dejeuner" was served at the
of the A. C. F., which was fol-
a number of brief addresses, the
: remarking upon the importance
iobile manufacture as a national
and the important bearing it had
er lines of French industry, nota-
roduction of alcohol, and of india
i the colonies.
e afternoon immense crowds
the vast hall. Agents from all
ance have gone to Paris, as
rospective owners, and many for-
ire attending the show. Among
noted foreigners is Herr May-
chnical director of the Daimler
Vorks, of Cannstadt, Germany,
lesigner of the Mercedes vehicles.
turally much pleased to see such
deas as mechanically operated in-
s, forced draught water cooling,
:h were first introduced by him in
ile motor design, so generally
by the French manufacturers. In
iew he expressed himself to the
at further advancement in auto-
:onstruction would be along the
ieral lines as now followed by his
r leading firms, but that radical
may be expected in tires, which
away with the annoyance from
; and the danger of skidding. He
that this is the field he is
in at present. The Daimler Com-
ws its 1902 models, the new mod-
having been completed. It ap-
wever, that there will be no rad-
iges in this machine. One im-
it will be in the cellular water
nd one of the new coolers is

of the stands are very artistically
l. The De Dion-Bouton stand,
nce, near the entrance, is deco-
h fawn colored silk hangings with
ige, the pillars and arches being
by rows of miniature electric
Other stands vary in design, but
te prevails everywhere.

The Mors firms show a chassis and a vehicle of their new type, which is made in two sizes, 11 and 18 horse power. They also show one vehicle of each of their older types, of 30, 15, 12 and 8 horse power respectively.

The new Mors model is designed on Mercedes lines, although retaining at least two of the more characteristic Mors features, aluminum water jacket and primary magneto ignition. The intake valves are mechanically operated. To this end a second cam shaft is located on the opposite side of the engine from where the exhaust cam shaft is located. Admission and exhaust valves are identical and therefore interchangeable.

The engine governor acts on the admission. The centrifugal governor operates a forked lever keyed to a shaft, which lever through the intermediary of a link mechanism operates a throttle valve comprising multiple openings in a cylindrical wall concentric with the stem of the valve. By means of an accelerator operated by a pedal this throttle valve can be locked in the full open position. The motor is, moreover, fitted with hand regulation of the admission; the shaft by which motion is transmitted from the governor balls to the throttle valve is connected by means of a flexible spring member to a hand operating device working on a notched quadrant. Owing to this spring connection one may operate the accelerator without first changing the throttle hand lever, as may be convenient when ascending a moderate incline. When the pressure on the accelerator pedal is released the motor automatically regains the speed at which it was running before the accelerator was operated, owing to the action of the spring in the connection between the throttle valve and its operating lever.

(To be continued.)

A. C. A. Matters.

Among those who have accepted invitations to attend the annual banquet of the club at the Waldorf-Astoria, New York, on January 24, are Job Hedges, Augustus Thomas, Simeon Ford, Senator W. L. Armstrong, Congressman James S. Sherman, W. Pierrepont White, chairman of the standing committee of the supervisors of New York State for road improvements; Edward A. Bond, State Engineer, all of New York; Congressman W. B. Brownlow, of Tennessee; W. E. McClintock and H. I. Budd, highway commissioners of Massachusetts and New Jersey respectively, and Willard A. Smith, superintendent of transportation department, St. Louis Exposition.

On December 23 G. O. Shield gave a lecture, illustrated with lantern slides, on "Snow Slides in the Canadian Rockies," and also related some of his big game hunting experiences.

LEGISLATIVE AND LEGAL.

In the case of Dr. Lewis Rutherford Morris, New York, against the Automobile Company of America, a judgment of $2,456 has been granted.

A report has it that the Cleveland (Ohio) automobile numbering ordinance is practically dead and is not being enforced by the police, but the latter deny it.

Trustees of Green Lawn Cemetery, Columbus, Ohio, may modify their rule forbidding automobiles on the grounds so that they can enter under certain restrictions.

Mr. and Mrs. George Arents, Jr., New York, have been fined $20 at Hempstead, L. I., for exceeding the legal speed limit. Mr. Arents paid the fine under protest and filed a notice of appeal.

The Westerly (R. I.) town council recently held a meeting to consider the question of adopting an order to remove automobiles from the streets, but adjourned without taking any action.

Frederick L. M. Masury, Cortlandt F. Bishop, Ernesto Fabbri and Deane Miller, all of New York, were held under bail in the Morrisania court on Sunday for speeding their automobiles beyond the legal limit.

Boston anti-automobilists intend to ask the Legislature to pass a bill debarring from Massachusetts all automobiles capable of developing a speed of over 20 miles an hour. Automobilists will oppose the proposition.

City Clerk Susdorf, of Buffalo, N. Y., writes that the automobile ordinance, as amended by the board of councilmen, remains in the hands of the committee on ordinances, to which it was referred by the Board of Aldermen on October 29.

We are informed that there will be no more hearings before the Board of Aldermen, New York, on the two pending ordinances relating to automobile licenses and rules of the road and that two amendments to the latter are awaited before action will be taken.

Richard M. Willis, Englewood, N. J., has won a suit brought by Herbert Quinting for damages for scaring his horse and upsetting his wagon with his automobile. Mr. Willis showed that Quinting upset his own wagon by driving his horse into a ditch.

The Chicago Automobile Club will submit to the judiciary committee of the City Council an automobile ordinance in place of the one vetoed by the mayor. It is understood the club will be satisfied with an ordinance requiring the numbering of machines with figures not over 4 inches high and a lamp to throw light upon them at night.

MINOR MENTION

Smith Centre, Kan., is to have an automobile factory.

An automobile club is contemplated in Phœnix, Ariz., where there are three machines.

A new line of automobiles has been started on the "North Side" streets, Chicago, Ill.

Capt. Adery C. Smith will establish an automobile route from Daytona, Fla., to outlying towns.

Contracts have been let for the construction of a new building for the Chaney Automobile Company, Terre Haute, Ind.

It is reported that the Olds Motor Works, Detroit, Mich., expect to turn out fully 10,000 automobiles the coming season.

The Chicago Automobile Club will ask Congress to appropriate $20,000,000 for building a national highway across the continent.

It is expected by the Crest Manufacturing Company, Cambridge, Mass., that the capacity of their plant will be 1,000 automobiles in 1903.

The capital stock of the Davis Motor Company, Waterloo, N. Y., has been increased, and E. G. Snow, Binghamton, has become a member.

Rooms for the Toledo (Ohio) Automobile Club will be arranged on the second floor of the Toledo Motor Carriage Company's new building.

The property, formerly occupied by the Industrial Cycle Company, Springfield, Mass., is being remodeled for the Knox Automobile Company.

Secretary Elliott, of the Syracuse, N. Y., Automobile Club, contemplates calling a meeting soon to form a State organization of automobile clubs.

The Warner Differential Gear Company, Muncie, Ind., will make differential gears of all sizes and styles, and will be ready for business about January 15.

C. C. Hildebrand has been appointed sales manager of the automobile department of the J. Stevens Arms and Tool Company, Chicopee Falls, Mass.

Dr. Ralph Elmergreen, president of the Milwaukee Automobile Club, condemns as absurd the ordinance to number automobiles proposed by Alderman Fass.

A Dayton capitalist and a Muncie (Ind.) inventor of a new automobile are reported to be interested in an enterprise to establish an automobile factory at Celina, Ohio.

Dr. B. Dorr Colby, Chicago, advises us that he has secured a patent for a lock, which while designed to be used on a certain automobile may be adapted to machines of all makes. He claims that it will securely lock and unlock the four principal operating levers simultaneously, instantaneously, and in eight different positions, so that a machine may be safely left unattended.

The new stable being erected for Helen M. Gould, New York, will provide for the accommodation of automobiles and have a hydraulic lift for raising and lowering them.

Creditors of E. J. Pennington are trying to secure entrance to his rooms in Racine, Wis., and recover furniture, etc., furnished him, but the hotel keeper refuses admittance.

The Baldwin Chain and Manufacturing Company inform us that of the carriages in the New York-Boston Contest that maintained the speed limit twenty-five had Baldwin chains.

Plans for reorganizing the Remington Automobile Company, Utica, N. Y., are being discussed by the stockholders, and it is believed that the factory will be reopened before long.

Postmaster Brewster, of St. Joseph, Mo., is quoted as saying that the use of automobiles in the postal service of that city is impracticable, as there are too many hills and unpaved streets.

Ralph Teeter, the thirteen year old son of John H. Teeter, a machinist, Hagerstown, is reported to have constructed an automobile which has a speed of from 18 to 20 miles an hour.

The Automobile Parts and Power Company, Muncie, Ind., will be ready by January 15 next to deliver orders for gas engines, transmission gears, carburetors, mufflers, water pumps and radiators.

The Automobile Club of Philadelphia, Pa., will hold an exhibition in Horticultural Hall during the week of March 2 to 7 inclusive. The secretary is H. D. LaCato, 712 Girard Building, Broad and Chestnut streets.

It is stated that the Standard Motor Vehicle Company, reported as incorporated last week, will have its headquarters at Chicago, and will establish factories at Buffalo, N. Y.; Milwaukee, Wis., and Kansas City, Mo.

Indianapolis parties are interested in a company organized to establish an automobile line in Anderson, Ind. The capital is $40,000 and the company has ordered seven machines. Lone Franklin, Muncie, is business manager.

The Autocar Company is about to erect a three story building as an addition to its shops at Ardmore, Pa. At present this company is said to employ 100 men making bodies at Amesbury, Mass., seventy-five on axles at Pottstown, Pa., and over 200 at Ardmore.

The Oldsmobile Company, at 138 West Thirty-eighth street, New York, are showing one of their power outfits, including motor, transmission, igniter, etc., complete and mounted on its frame, the motor having portions cut away so that the working of all the moving parts may be observed when the engine is "cranked." From this a very clear idea can be obtained of the manner in which a four cycle gasoline motor operates.

S. M. Butler, secretary of the Automobile Club of America, was dined and "watched" at the New York Athletic Club on December 22 by the participants in the Reliability Contest.

The first exhibition to be held in Japan, which will have a recognized foreign department, will open at Osaka on March 1 next. A number of firms have secured the right to erect special buildings, among others the importing house of Andrews & George, of Yokohama.

William E. Metzger has been appointed by the American Automobile Association as its racing representative in Detroit, Mich., and empowered to appoint timers, scorers, etc., in case Barney Oldfield decides to try again for an official 1 and 5 mile automobile record.

The automobile dealers of New York, especially those handling light American carriages, report that despite the unfavorable season there is quite a demand for second hand machines, and that an unprecedented business of this character is anticipated during the coming season.

In January tests to determine the availability of automobiles in the general postal service of the country will be made at Washington, D. C. The plan is said to be to contract with some company to supply and keep in order a large number of machines, if the tests prove satisfactory.

The Cincinnati Automobile Company, Cincinnati, Ohio, state that they recently went into the manufacture of kerosene burners, mufflers, running gears and complete machines, which they repair, charge and store. They are also agents for the "Rambler" and International automobiles.

Fickling & Fulton, 248 West Fifty-fourth street, have secured the New York agency for the Covert motorettes and touring cars, and have organized a branch of their business to fill orders for automobiles of all makes. They state that they also have the facilities for building cars to order.

The Waterloo Motor Works, reported last week as having been incorporated, is a consolidation of the Davis, Waterloo and automobile factory interests. J. R. Vaughan, C. O. Lamson, G. B. Miller, F. B. Ballou, Emmons Johnson, Thomas Cascaden, Jr., J. A. Lupton, C. E. Duryea, L. Witry, T. C. Menges and E. E. Manhard are the directors.

Swindler Pennington Reappears.

We are reliably informed that E. J. Pennington has turned up in Detroit, Mich. where he is doing business as the Anderson Carriage Company, which is represented to be the Detroit agency of the American Automobile Company, Racine, Wis., with head offices in London and Paris. Our advices state that he has succeeded in mesmerizing a few people there, and that incidentally he has disposed of some of his diamonds to a Detroit pawnbroker.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to Motor Interests

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he Paris Exhibition.

ie quite complete reports to hand is Automobile Exhibition, which doors on Thursday last, it may led that the event was more than successful. The success of an ex- epends first upon the patronage ors and then upon the interest mong the public, i. e., the number of visitors. As far as the patronage of the industry is concerned, it has already been stated that every inch of space had been let and that the demand could not be satisfied. The attendance has also been very satisfactory, the receipts from admissions the second day, for instance, having been 15,000 francs, which, as the admission was 1 franc a person, and less under certain conditions, shows a paying attendance of over 15,000 people for that day.

At an exhibition of this kind, and especially if so much "bruit" is made about its grandeur, one naturally looks for some important practical improvements and novelties. The tendency is, of course, to look for these at the stands of the leading manufacturers, and if valuable improvements are shown by some hitherto comparatively unknown firm, as is not unlikely, they are liable to be overlooked in the first survey. However, the result of this first survey is that absolutely nothing of startling novelty was shown.

The exhibition was characterized by two tendencies. The first of these consists in the exertions of many exhibitors to draw to their stands those crowds of sightseers who are attracted by the unusual or the sensational. And some rather "yellow" methods were adopted by the extremists. For instance, at one stand was shown a vehicle which had been, so it was alleged, employed a short time ago by a couple of elopers belonging to the better society of Paris. The show management, to control this catering to the love of the sensational, had reserved the privilege of passing on all the literature, etc., to be distributed, and upon the exhibits and stands.

Serpollet's new racing monster, with which, as he told President Loubet, he expects to make a speed of about 90 miles an hour, must also be classed under this head, for it appealed undoubtedly more to those who came for the purpose of sightseeing than to those who came as intending purchasers. An eight cylinder motor, at the stand of Charron, Girardot & Voigt, also possessed in a greater degree the charm of extravagance than the stamp of practical evolution.

Exhibits of this kind were to be found on a large number of stands. Such exhibits may slightly affect the gate receipts, but have otherwise little influence on the success of the event.

The other tendency referred to is that of copying the leading features of some successful make—in this instance the Mercedes machine. The fact has been made the most of by the German firm, who only exhibited its 1902 models, not showing any of its new vehicles "for fear they might be copied," thus giving the impression that they would be a year ahead of their French competitors with their new vehicles. The reflection that their most prominent manufacturers almost without exception found it expedient to follow in the wake of the only German automobile manufacturing firm they would consider on a par with themselves ought to lower the pride of the French several degrees.

All this, however, relates only to one extreme end of the movement, the fad end. These luxuriously equipped and enormously expensive cars naturally appeal most to the sightseers and to the reporters of the dailies. But what might be called the centre of gravity of the business interests of the industry is located toward the other end. It is somewhat of a contrast after hearing of the brilliant success of the Mercedes car to learn that only three of this year's models have been sold in England; few, if any more, in the United States, where they have been reported particularly popular, and that the rate of production of these cars is only one a week.

In the cars of medium power and cost, for which there is the largest demand, there have been comparatively few changes. The manufacturers of such cars do not seem to find it necessary to keep up a demand by getting out distinctly new styles every year.

The success of the show indicates that

there is no sign of abatement in the progress of the automobile movement in France, and the brightest hopes may be entertained for the future. Another conclusion to be drawn from the show is that radical changes in design will be few and far between from now on, except, of course, that freaks will turn up and have their day, and that manufacturers who are catering particularly to the fad end of the business may find it advantageous to make annual changes of considerable outward prominence.

Some Suggestions to Exhibitors.

The two annual American automobile shows being close at hand, a few suggestions to the exhibitors may not be out of place. We believe every firm which has a vehicle embodying features of excellence and of originality will do well to show up these points as prominently as possible. Wherever possible a vehicle without body on which every detail of the mechanism can be examined conveniently should be shown. Conditions are changing, and the number of experienced users who attend the exhibitions is increasing from year to year. There is absolutely no doubt that the New York Show next month will be visited by a large percentage of the enthusiasts in the East who now own automobiles. Whether they buy at the show, or as a consequence of their visit, will depend very much upon what they see. These men, with several years of experience behind them, usually know that body outlines and character of finish are things of minor importance in an automobile for practical, continual use, and that the satisfaction which a car may give depends more on its internals, its mechanical construction. The exhibition of chassis is therefore bound to increase the sales of machines of merit.

A defect of many of the shows so far has been that they were not ready at the time of opening. This has been partly a result of the formative state of the industry and may be expected to pass as things become more settled and a smaller proportion of the exhibitors are firms just beginning to manufacture. The incompleteness of certain stands at the time of opening detracts from the show as a whole, but is, of course, particularly harmful to the interest of the respective exhibitors, if they can profit at all by exhibiting. It seems to us that every effort should be made to have the stands in complete readiness when the doors open.

It is hardly necessary to call attention to the advisability of having technically competent representatives at the stands. Glittering generalities count for little with most of the more desirable visitors, and the sight of an attendant nonplussed by a practical question of some experienced user is not calculated to advance the interests of an exhibitor.

Finally, a tasteful arrangement of exhibits and some appropriate decoration will increase interest in automobile shows generally. In this latter respect we have, of course, much to learn from France.

The English Automobile Bill.

The new bill concerning the regulation of automobiles in England has now been before the automobilists of that country for a considerable time, and opinion regarding it seems to be pretty well divided, to judge from the position assumed by the various publications. The committee of the Automobile Club and the Legislative Committee held a consultation with regard to the bill on December 3, at which they agreed to advocate identification numbers, as proposed by the bill, but thought that it would be advisable to incorporate in the bill a clause providing against wanton persecution and abuse of the identification number requirement. It has been one of the strongest points of the opposition, apparently, that if identification numbers should be made obligatory, and numbers given by the police or public be regarded as sufficiently trustworthy to identify the guilty party in case of an infraction of the law, much persecution and blackmail would result. The acknowledgment of such possibilities by the club committee is pointed to by some as a sign of the imperfection of the original bill. Undoubtedly the bill as originally proposed was imperfect in more respects than one, but if the objectors want nothing but a "perfect" law they will have to travel at 12 miles an hour till the end of their days.

The most serious defect of the bill is undoubtedly that it proposes to abolish the speed limit altogether. Such a measure is not calculated to urge drivers to use prudence, so essential if friction between the public and the automobilists is to be avoided. And it is almost certain that the bill would meet insurmountable obstacles in Parliament for this very reason. This weak point seems now to be recognized even by the parties who introdu[ced the] bill, and it is announced that the [govern]ment will probably bring forth a s[ubstitute] with more chance of successful pa[ssage].

It is already known that owing [to the] great amount of work before Pa[rliament] the bill will not come up for consi[deration] at the present session. For some [time to] come the old order of things—[speed] limit, police traps and persecuti[on—will] therefore continue in merry old E[ngland] and English automobilists will [have] plenty of time to agree—or disag[ree—on] what they want in the legislative li[ne].

Various Pressure Lubricat[ing] Systems.

Ordinary gravity lubrication is n[ot] satisfactory for certain parts of a[utomo]biles, for the reason that, as the f[orce ef]fecting the feed is so small, accur[ate ad]justment is a difficult matter, and a[lso be]cause such lubrication takes no acc[ount of] the variation in speed of the parts [to be] lubricated, to which speed the feed [should] be proportional. Mechanical oiler[s seem] to provide the only satisfactory s[olution] of the lubricating problem, and man[y makers] are adding them to their machine[s, but as] the cost of such oilers is considerab[le] we can hardly expect to see the[m pro]vided generally by automobile m[anufac]turers in the near future. French [manu]facturers have sought the solution [of the] lubrication problem along other [lines,] which, although less perfect theore[tically,] insure greater simplicity of the lubr[icating] devices. In a number of multiple [cars] marketed in France the pressure [of the] exhaust gases is made use of to f[orce the] lubricant to the various bearing s[urfaces.] In these lubricators the feed can [be ad]justed by more or less closing a v[alve in] each individual passage, and also th[e feed] through all passages can be varied [simul]taneously by throttling the exhaust [gas] passing through the oiler more or le[ss].

At the Paris show a new syste[m was] first publicly shown, in which the p[ressure] causing the circulation of the cooling [water] is made use of for feeding the oil. [Un]doubtedly this pressure is closely p[ropor]tional to the speed of the engine, a[nd the] rate of speed would therefore be [very] nearly correct at various engine s[peeds.] This system is worthy of the attent[ion of] our designers.

Managers of the St. Louis Fai[r pro]pose to have an exhibit of the [most] prominent automobile manufacturers.

merican Impression of the Paris Show.

By Joseph Tracy.

entering the exhibition hall the ught that comes to the foreign that of the great number of firms ce occupied with the construction mobiles. The main hall in the Palais—not including the galleries lcohol exhibit in the wing—has a ace of about three and one-half e area of Madison Square Garden, e is hardly room for another ma- The new models in general have wheels, larger tires and much mfortable bodies. The brakes are bstantial and more powerful than , and are often all double acting. n is putting both foot and emer- rakes on the hubs of the rear a band brake on the outside, to be by the hand, and an expanding the inside for the foot brake, and uble acting. This is a good ar- nt, as the machine can never run ould the transmission get discon- r broken. It has the disadvantage, mon with all expanding ring of small range of motion, and it ently needs close adjustment.

fad" in frames is channel steel of on, which are joined with angle lates at the corners. This makes a at, light and strong construction, at the same time very flexible. le exception is the C. G. V. car, ses a frame of square seamless e, into which is forced seasoned nhard & Levassor still use the ar- ood frame, as do a few other con- Some are discarding the false or e on which is hung the motor and sion gear box. The Cannstadt people dispensed with it a long o. The tubular frame is disap- except on a few voiturettes.

s are usually longer and nearly al- ni-elliptic. Steering gears are not much, excepting that there is a tendency to group the gas and ntrol handles either on the column he wheel. Panhard & Levassor the gas and ignition by means of ll hand wheels mounted on the wheel, with their axes at right o the steering post. Those hand re held by ratchets, and operate ion and gas throttle by means of xible wire cables, which are wound ound by turning the little wheels, nay be held in any position by f the ratchet. A spring keeps the tension. Nearly every machine iding gear transmission except the n, which still has the individual Several machines are driving di- he high speed. The reverse is in- by means of an extra spur gear, gears. The forward and reverse re nearly always controlled by one he clutch shaft and the differential shaft on chain driven machines and the back transmission shaft on chainless machines are all fitted with "cardan" or flexible joints, to allow for disalignment on bad roads. The gear boxes have large covers for easy inspection of gears, and can usually be detached by taking out four bolts when the differential or back transmission shafts have been uncoupled.

The chainless drive does not seem to be making any further progress, as quite a few of the small cars are still using chain drives. Many makers are lubricating the bearings on the transmission shafts by oil pipes from a tank on the dashboard, while the older makers stick to the splash system. The argument against the splash is that when the car is going slowly, uphill, for instance, the gears are running too slow to splash and the bearings may run partially dry. The same argument is being used against piston lubrication by the splash system. As a result many firms are putting in a forced feed to the pistons, and crank bearings from a tank placed on the dash, which also supplies the transmission, and in some cases the differential on the rear axle and the sliding joints on the back transmission shaft. The axles, especially the rear ones on bevel drive cars, are noticeably heavier.

Coming to the motor, the vertical, multi-cylinder, placed in front, is almost universal. The tendency seems toward higher powers, even on small cars. The most radical change is the adoption of the mechanically operated inlet valve—even Panhard & Levassor have adopted it. The governing is nearly always by throttling the inlet. A good many motors have fibre gears on their half speed shafts and on the magnetos. A large number of machines have magnetos for ignition instead of batteries. Panhard exhibits one machine fitted with a dynamo (Motsinger).

The great majority of machines use the jump spark system of ignition; still, the make and break spark seems growing in favor, probably on account of being better adapted with a magneto. The commutators on the cam shaft are now all made dust and water proof, and are covered with a glass, through which their operation may be watched. On a great many machines the ignition cam and commutator are placed on the end of a vertical shaft, which extends as high as the cylinder heads. This shaft is driven from the cam shaft by bevel gears. The objects are accessibility and protection from oil and dirt. One machine uses both jump and make and break spark. On the Rochet-Schneider, which uses the latter, the igniter plugs fit like caps over the inlet valves, one crosspiece holding down both, which may be removed by unscrewing one nut. Many machines, the Renault, for instance, have sheet brass clips, instead of wires, connecting the ignition plugs. These clips snap over the end of the plug, the other end of the clip hinging on the ignition wire, and may be slid off the ends of the plugs without the use of screw drivers or pliers; and for that reason the porcelains are not liable to be cracked nor the wires through their centre twisted out of place.

The igniters, whether high or low tension, can also be taken out much quicker. In the four cylinder Decauville the primary wires, instead of being attached to binding screws on the commutator plate, are fastened to small insulated brass blocks, which are stationary on the motor base. On the commutator plate, insulated from it but electrically in connection with the four brushes, are four corresponding brass blocks, which make a sliding contact with the blocks on the motor base, thus making electrical connection between the batteries, coils and commutator brushes, without wires being attached to the commutator. This obviates the trouble of wires breaking at the binding screws, which is caused by rocking the commutator plate to and fro, to advance and retard ignition. Two machines use catalytic ignition. The Simms-Bosch Company have a magneto on exhibition which produces a jump spark by breaking the primary of a coil which is mounted between the poles of the magnets.

A few of the leading makers are making their cylinders out of gun steel forgings, each cylinder separate and complete in itself, with long pistons (steel castings) and cast iron rings. The jackets do not extend down the cylinder barrel so far as in last year's models; they are made of sheet brass and soldered to the cylinders and heads. This makes a very light and strong construction, and obviates the necessity of having to throw away a cylinder partially machined, on account of a crack or blow hole.

Rubber hose connections are used on nearly all the machines, instead of the old style flanged connections on the water pipes. A good many machines have their water tanks on the front of the dash. Circulating pumps are nearly all gear driven, although a few are driven direct by an extension of the half time shaft. They are almost all gear pumps. Renault is, I am told, the only one using the thermo-syphon system of circulation. One of the most noticeable changes is without doubt in the coolers. Everyone seems to copy the Mercedes "beehive," and generally the fan behind also. Even the Panhard Company use the "beehive" on one of their models. The fan is on the front of the flywheel rim, and is arranged like the vanes in a centrifugal pump, to throw the air out tangentially, and not through the flywheel, as the Mercedes does. The C. G. V. use a tank in front, through which run a number of rather large tubes, something like the old Winton. Pressure gauges are nearly always used to verify the circulation. In the small cars the circulation may generally be observed by unscrewing a cap. A few cars pass some of the circulating water round their carburetors to maintain a constant temperature, and heat the gaso-

line in cold weather. The new Mors uses the circulating water to operate the oil tank which feeds the motor. Their cooler is somewhat different from the "Mercedes"; it is patented, I understand, and is used by quite a number of other makers.

A large number of machines are using the exhaust pressure through a reducing valve and screens to work their automatic oilers which lubricate the motor and transmissions. A few, however, still use the mechanical oil pump, driven usually by a belt from the motor. Compression grease cups are larger, as are the grease pipes leading from them to the bearings.

New clutches are usually of the Panhard type, viz., leather shod cone. They are invariably of the non-thrust type. The C. G. V. car has a band clutch resembling a brake. Another, Clement I think, has a four segment, expanding clutch, and, of course, without thrust. Balls are generally used in the collars through which the pressure of the spring is applied to the cone; also on the collars, which are acted on by the pedals for disengaging the clutch.

The flywheel and under part of the motor and transmission are protected by sheet metal casings in many machines.

The bonnets are following the Mercedes style and are usually narrow and horizontal on top. Nearly all are without slits and are airtight in order to secure proper action of the radiator fan. Four lamps are usually fitted, two acetylene "phares" and two kerosene lamps on the dash; also a rear lamp, which illuminates the number fastened on the back of the car and also shows a red light to those following.

The mud guards are always designed to thoroughly protect the passengers, and are made in both wood and metal. The steps are well braced, of ample size and placed fairly low.

A Personal Ideal.

By Albert L. Clough.

Probably almost everyone who has had much to do with motor vehicles cherishes a belief that he could build a carriage that would almost realize his ideal of what an automobile should be. It is probable, too, that no two men, if they attempted the task, would produce exactly the same sort of a vehicle. There is an opportunity for an almost infinite number of combinations of alternative constructions among the different parts of such a machine. While there are quite a number of good machines on the market it is likely that not one of them exactly meets the ideal requirements of any automobilist. If several makes of machines were taken and some few points adopted from each one the requirements of such a person might be met.

It might be of some interest if we could have in the columns of The Horseless Age a series of articles from men who have had considerable experience with motor vehicles giving their ideas of what would constitute in their minds, as nearly as possible, the perfect vehicle. There have been from time to time articles which partially covered this ground, and more articles of this sort would furnish profitable reading for the manufacturers.

If I were to have built to order a motor vehicle for general all around service over average American roads, carrying two people, I should like it to embody as far as possible the following points: In the first place, as to the running gear. This is the portion of the vehicle upon which the most pains should be taken as far as endurance is concerned. I would not hesitate to add weight there in the interests of strength and durability; I would adopt a wheel base of not less than 80 inches and, of course, the standard gauge; the frame should be of ash, reinforced with structural steel; the rear springs should be double elliptic and of greater length than I have ever seen on a carriage of this class; they should also have a very large allowable deflection before any possibility of striking occurs. The front springs should be of the platform type, so as to give the gear a high degree of flexibility and there should be no reaches or under frame—all driving stresses being borne by the springs and distance rods. The rear live axle should be of nickel steel and of tubular construction, one wheel being carried on a sleeve carrying one gear of the differential and the other wheel upon the solid or tubular internal axle carrying the other differential gear. The differential should be placed close to one of the main axle bearings and should be of the bevel gear type, completely enclosed. The rear axle bearings should be of the roller variety, and two bearings should be used on each side, one inside and the other outside of the springs. The front axle should be of nickel steel tube, somewhat arched and trussed beneath and the steering knuckles should be extremely massive, with the axes as close as possible to the plane of the wheels. In putting the running gear together I would use no stock carriage fittings at all, but only bolts and nuts with cut threads and close fits; the wheels should be of wood and of 34 inches diameter, the front ones running on roller bearings.

As to tires, one hardly knows what to specify, but they should be chosen large enough, say, 4 inches, and of the inner tube variety. The steering should be by means of a wheel of large diameter; the inclined column of which is capable of being "broken" for the convenience of passengers; I would use a worm gear and sector, and all pivots in the steering linkage should have means for correcting the lost motion due to wear. All parts of the steering mechanism should have a large surplus of strength so that the gear should not only be safe but prove "stiff" in operation. As the steering gear is a life and death matter, I would make assurance doubly sure in every detail of its construction, making it humanly impossible for anything to work loose or break. The two brakes should be entirely separate; the principal one acting upon auxiliary bronze rims bolted to the rear wheels and actuated by a pedal working through an equalizing linkage. The other brake should act upon a drum carriage by the transmission gear and should be operated by the clutch lever when thrown in the opposite direction from that which sets the clutch. In general I would consider strength more carefully in the running gear than in any other portion of the vehicle and I would not economize on metal wherever it could be advantageously added. The prime requirements of an automobile are safety and durability as a vehicle. Everything else is secondary.

The engine of this vehicle should be of the double opposed horizontal type and it should be mounted in the rear of the frame. Personally I do not care for the vertical engine in front for my own use, in an ordinary vehicle, for several reasons, principal among which is the fact that this construction practically precludes the use of the double opposed cylinder motor and calls for a multiple cylinder engine which, if of two cylinders, is not free from vibration and if of more than two cylinders, becomes too complicated for use upon a vehicle of everyday utility.

I should wish an engine of about 5 inch bore and 7 inch stroke, very carefully balanced and capable of running up to 1,000 revolutions per minute. The valves should all be mechanically operated and of unusually large dimensions and they should be capable of easy removal by unscrewing the cages which contain them. The secondary shaft which operates the valve mechanisms should also carry at or near its rear extremity the contact devices for the two cylinders. A circulating pump should be, if possible, geared to the secondary shaft and a mechanical lubricator should be connected to this shaft as directly as possible. The carburetor, too, should be a part of the engine. The engine and its immediate auxiliaries should form one integral mechanism and should all be carried upon a rigid steel frame firmly bolted to the sills of the vehicle.

In designing this engine I should aim to save as much metal as possible by using the very best material, irrespective of cost, and by employing the best pattern making ability and the highest class founding. There is much metal wasted in many engines by crude pattern making and inferior work in the foundry. The cylinders and their heads should be cast integral and be bolted to the crank case. In boring the cylinders, the very highest grade of machine work should be imperatively demanded and the cylinder bore should not vary perceptibly from a cylinder of the required diameter throughout its entire length. The piston rings should be turned up exactly the size of the cylinder bore in a jig. The connecting rods should be

Buchet Stand, Showing 70 Horse Power Motor.

Gobron Brillie Stand.

De Dion-Bouton Stand.

capable of easy adjustment and accessible by removing the crank case cover. The crank shaft should be machined out of a single forging. The flywheel should be of as great diameter as permitted by the form of the carriage body and its weight should be concentrated in the rim as far as possible. The most extreme care should be taken in regard to keying it to the shaft securely. The contact device of the ignition system should be as accessible as possible from the rear of the carriage and should be provided with a centrifugal device to automatically advance or retard the spark to a degree properly proportioned to the engine speed. The electric contacts should be of hardened platinum and all working parts of the device should be properly hardened and thoroughly enclosed by an easily removable cover. The spark plugs should be so placed as not readily to be fouled by an excess of lubricating oil and so as not to receive mud or water from the road. All electric wiring should be of rubber covered cable enclosed in conduit tubing and in the secondary circuit it should be carried on porcelain. The two induction coils should be in a most accessible position and covered by a readily removable case. Their vibrators should be capable of easy adjustment and equipped with hard platinum points.

A single carburetor should supply both cylinders, but it should be of very ample size and of the float feed type, with means for preventing irregular action upon grades, and also provided with an automatic air valve arranged to keep the quality of the mixture uniform at all engine speeds. The charge admitted to the cylinders should be regulated by limiting simultaneously the motion of the intake valves, and this should be determined by means of a pedal, which should be of ample and comfortable form, so as not to tire the foot.

The transmission device should be of the sliding gear variety and entirely enclosed. It should be mounted upon the steel frame which carries the engine and connected to the engine shaft by a flexible coupling. It should provide for three forward speeds and a reverse, and the low gear should be lower than ordinarily provided. The gears themselves should be of ample size and cut in such a way as to throw together easily. The engaging edges should be somewhat beveled. The gear shafts should have oil pockets, arranged to be kept filled by the splash of the gears themselves running in the oil in the case. The single clutch upon the engine shaft might well, if practicable, be incorporated into the flywheel and should be of the all metal type, of very large wearing surface and easily lubricated—if necessary by a special oil cup—and there should be an interlocking device between the clutch lever and the gear shifting lever, so as to prevent the movement of either unless the other is in the proper position. The driving and driven sprockets should be of the best steel plate—not of cast iron, as so often furnished. I would not have the machine geared excessively high, but would rather be content with a moderate maximum speed and the ability to negotiate all ordinary conditions on the high speed.

I would use a chain of altogether greater strength than I thought could possibly be required to drive the machine under the most trying conditions. A good case, to protect the driving sprockets and chain, is not an unreasonable desideratum. The distance rods which connect the rear axle to the vehicle frame should be rather long and as nearly as possible in the line of the chain pull. They should have easy adjustment and their connections to the rear axle and the carriage frame should be of such character as to enable wear to be counteracted.

I would locate the water tank under the bonnet forming the front dash, and the gasoline tank might well be placed under the seat. There would be plenty of room for tools under the bonnet as well. The radiators should be of more than usual surface. In addition to the controlling devices mentioned, I would have means of opening the compression cocks from the seat and also of flooding the carburetor, and there should be switches for changing from one set of batteries to the other and also for throwing off both cylinders instantly. The mechanical lubricator before mentioned should feed the two cylinders and the main engine bearings, from which the oil should pass to the crank pins by centrifugal action.

In writing of what one would like in a vehicle, it is likely that the impossible may be called for, and it is only when one comes to sit down to a drawing board and attempts to realize on paper the ideal sought after that one appreciates the limitations and difficulties involved; but when one is consulting one's desires alone it is just as well to ask for all kinds of perfection. The points which I should strive particularly to embody in a special machine for my own use would be a running gear so strong and reliable as never t the cause of worry, and a motive pow conscientiously constructed as to elim many of the common troubles. I largely a question of honest and co machine work, and I would strive to the automobile built as carefully as an press locomotive. With the knowl that we possess today good workman is the decisive factor determining suc and I believe that this, together with best material and ordinary good de would create a vehicle along the ge lines prescribed, which should not w more than 1,600 pounds and which sh really constitute a useful and reliable mobile.

The Paris Automobile Exhibit

(Continued.)

By L. Berger.

The general arrangement of the va classes of exhibits is approximately same as last year. In entering from Avenue Nicolas II one sees to the and left in the large hall the exhibi the automobile manufacturers. In the leries the exhibits of allied industrie shown; and at the end of the hall, t left, pneumatic tires and accessories. the smaller hall, facing the Avenue d tin, alcohol motors and apparatus are hibited, and in the basement statio engines. Not an inch of space is u cupied and applicants for space had to be turned away.

This year every manufacturer taken great care in the decoration of

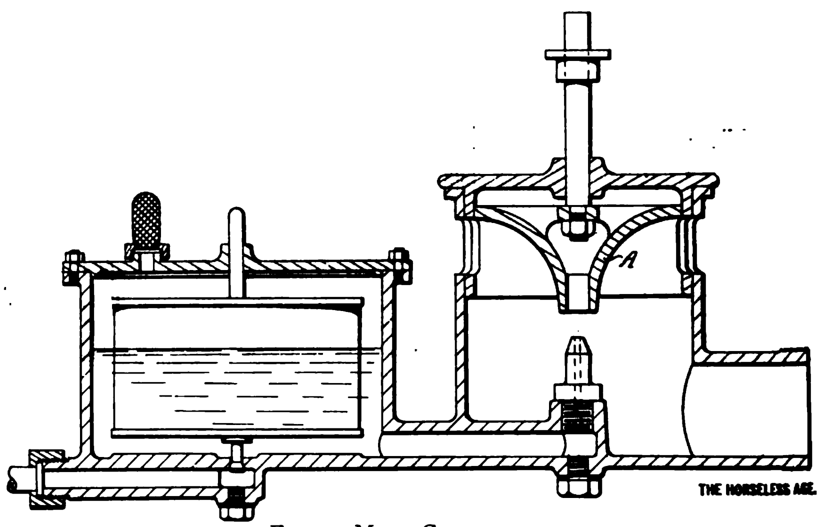


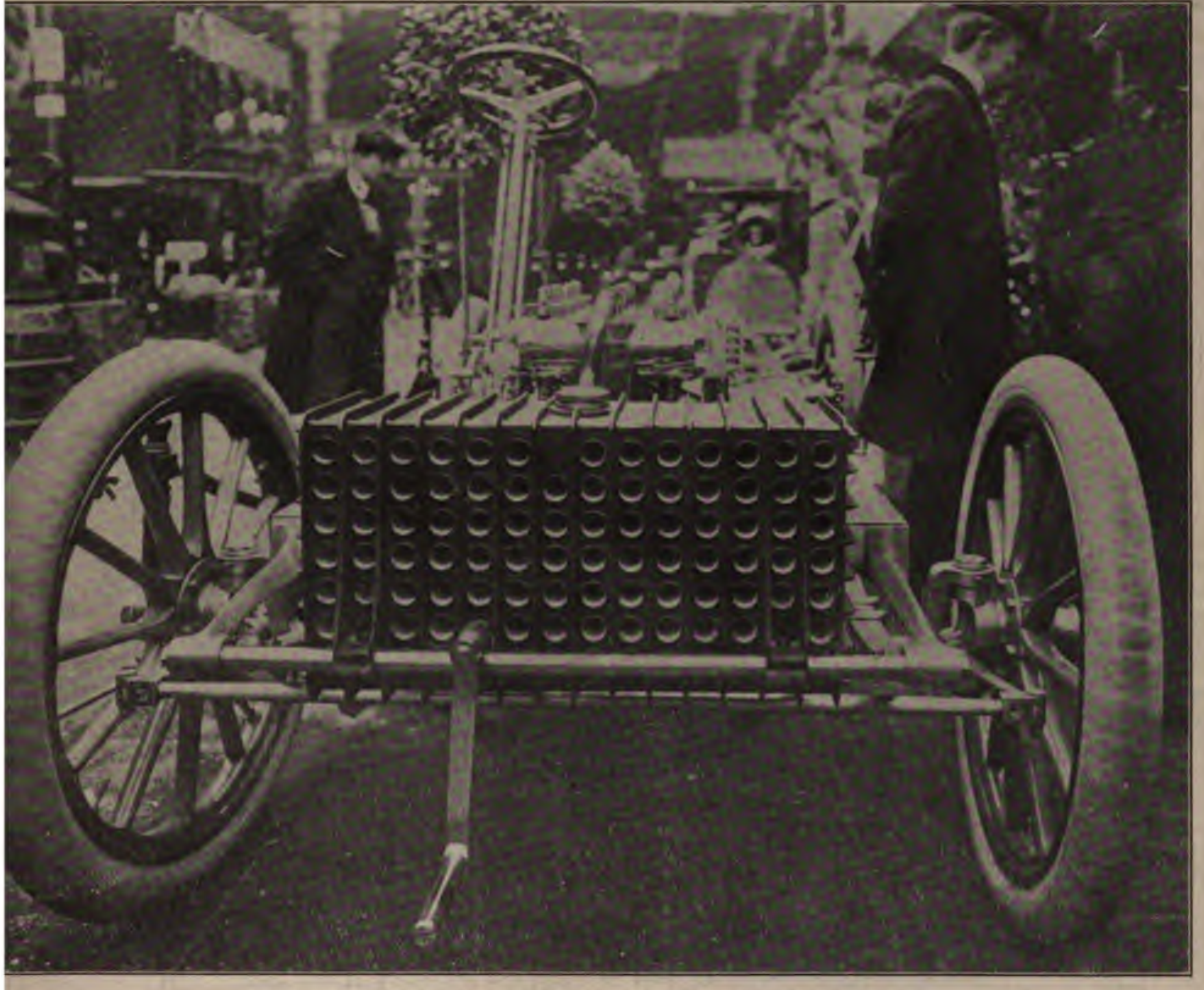
Fig. 1—Mors Carburetor.

stand. Panhard & Levassor have er a veritable temple with Greek and columns. The Darracq Company ha stand constructed in "modern styl acajou, and Charron, Girardot & a simple and pleasing edifice. The cipal foreign exhibitors are the D Company, of Cannstadt, Benz and English firm Napier, about the exhib which I shall give some details furth

A series of lectures are given

DECAUVILLE 40 HORSE POWER RACER.

DECAUVILLE CHASSIS.



C. G. & V. 18 HORSE POWER CHASSIS WITH TUBULAR COOLER.

THREE CYLINDER 8 HORSE POWER PANHARD.

LATEST SERPOLLET FREAK.

show upon legal subjects connected with automobilism.

What appear to be the chief improvements this year with the majority of the manufacturers are:

1. Long frames and running gears with long and flexible springs; 2. Intake valves mechanically operated; 3. Suppression of noise and vibration; 4. Governing by throttling the intake; 5. Honeycomb radiators; 6. Direct drive on the fourth or

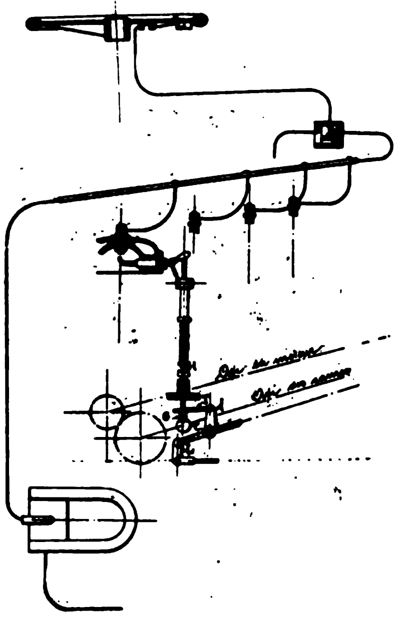


Fig. 2.—Mors Ignition System.

high gear; 7. Better regulation of lubrication; 8. Equal sized wheels in front and rear; ball bearings wherever they may be used.

These eight points characterize the progress of the year as reflected by the exhibition. These changes in practice are based upon touring experience and upon the results of last summer's races, and constitute therefore real improvements.

THE MORS EXHIBIT.

The carburetor (Fig. 1) is of the usual constant level, spraying type. The novel feature consists in a throttling device arranged in the spraying or mixing chamber. This throttling device A has the shape of a funnel, the upper base of which fits exactly in the cylindrical bore of the spraying chamber. The funnel is fixed to the lower end of a vertical stem which extends through the cap of the mixing chamber, by which means the funnel may be moved up or down. The mixing chamber will be seen to be provided with a series of openings in its side wall, through which the air enters. The carbureted air leaves through a passage at the lower part of the mixing chamber on the right.

When the funnel shaped throttling device is in its lowest position, it completely closes the air intake openings and also the gasoline nozzle. In intermediate positions the air intake is throttled more or less. The throttling device is intended to be operated by the centrifugal governor of the engine.

The ignition system is illustrated in Fig. 2. It is of the primary, or make and break type, and the current is furnished by a magneto driven by the engine through spur gears. The stationary, insulated electrode passes through the cylinder head, and the movable electrode, which has a rocking motion, through the side wall of the cylinder. This movable electrode is operated by a rod pushed by a cam on the intake valve cam shaft.

Formerly the point of ignition in the Mors vehicles was invariable, but in the new 11 and 18 horse power models the driver can advance the ignition up to the most favorable point when the engine runs on the high gear at high speed. The variation in the point of ignition is obtained by the displacement of a movable part provided with a roller G (Fig. 2) interposed between the igniter cam C and the igniter rod *t*. The displacement of this piece is effected through the intermediary of a lever *l*, by a shaft operated by a lever L, which is connected to the operating device handy to the driver when in his seat. This operating device is a small handle located on the steering wheel and which m moved back and forth on a notched

The motor is started by means ratchet crank in front, which engag disengages automatically with the shaft. This result is secured as fo A pawl on the starting crank drops weight into a position of disengag when the starting crank is in the v position, but engages in a notch ratchet wheel on the motor crank when the starting crank is turned. A as the motor speed exceeds the spee which the starting crank is turne ratchet engagement is automaticall leased.

The new Mors change gear, descri THE HORSELESS AGE some months a used in these new models. It will b membered that the drive on the high is direct. A further advantage secur this change gear system is that o lower speeds the transmission is th the less pair of gears than in other sy with direct drive on high gear. A c clutch is employed, in which all end sure is compensated.

The frame is built up of pressed The front and rear crossbars and the and rear bars supporting the gear bo also of pressed steel. This has pern to give these pieces a variable sectio cording to the stress at different p along their length. The front of the f is narrowed, to allow of turning shorter radius than would otherwis possible.

As has already been noted, the cooler is of the honeycomb type, wi fan to force the air circulation throug An illustration of the cooling syster the bonnet and the entire front of the cle is shown in Fig. 3. From this fi it will also be seen that the intake and haust valves are located on opposite of the cylinders. Each set of valves separate cam shaft, these shafts driven from the crank shaft by spur The front view also shows the rota culating pump and the magneto, whi

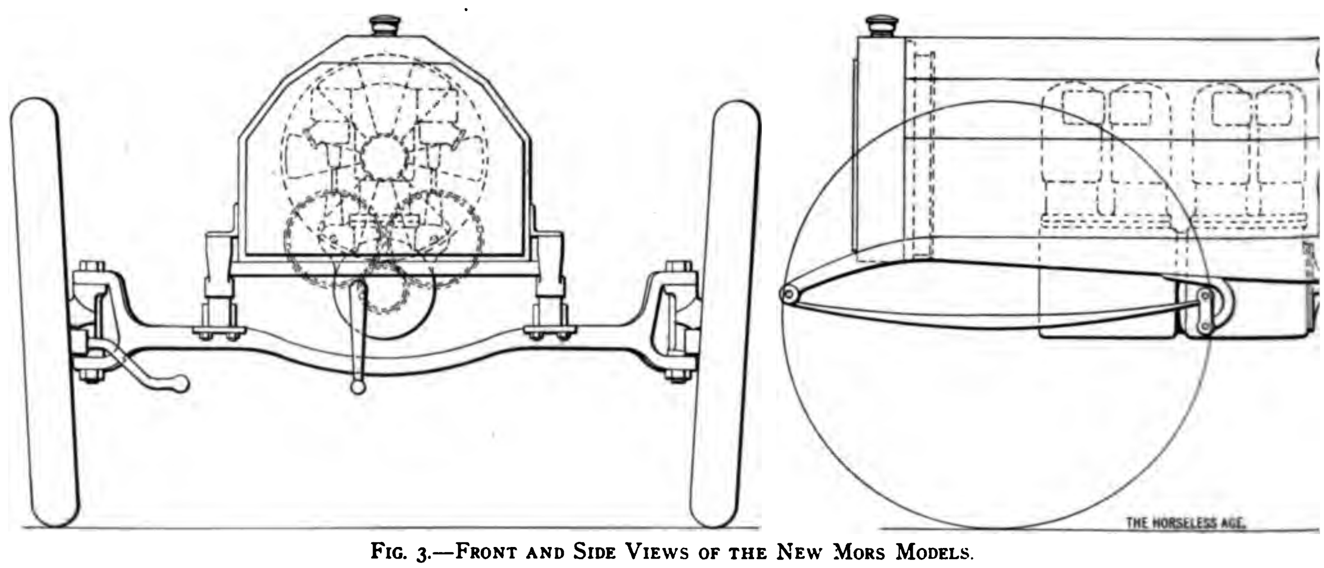
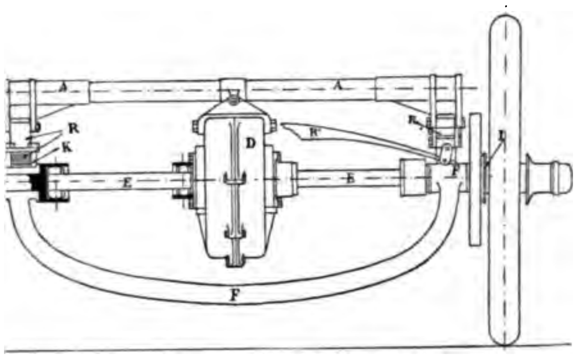


Fig. 3.—Front and Side Views of the New Mors Models.

ven by spur gears. The advan-
ned for the honeycomb radiator
otor may be run at slow speed
eriods without evaporating an
amount of water. The trouble
g the water supply is therefore
d, as the motor never heats ex-
ne lubricating oil is not burned.
em of lubrication is based on a
ole. In most systems in which
it is fed to the cylinders by pres-
ressure is derived from the ex-
is claimed, however, that it is
ılt to obtain a constant pressure
ource and one capable of regu-
the new Mors vehicles the pres-
eding the lubricant is furnished
ing water, which forces the oil
ht feeds, according to the usual

cylinder motor renders this construction objectionable when small sizes are considered. To meet these various objections the three cylinder machine referred to was brought out, and it is claimed that great care has been bestowed upon the arrangement of the connections to secure maximum simplicity and accessibility.

hollow spindles on which the driving wheels rotate. In the middle of this bridge is attached the casing of the differential gear. From the differential gear casing extend on either side shafts with universal joints. These shafts extend through the hollow spindles upon which the driving wheels revolve, and are secured to the



:G. 4.—De Dion Rear Axle Construction.

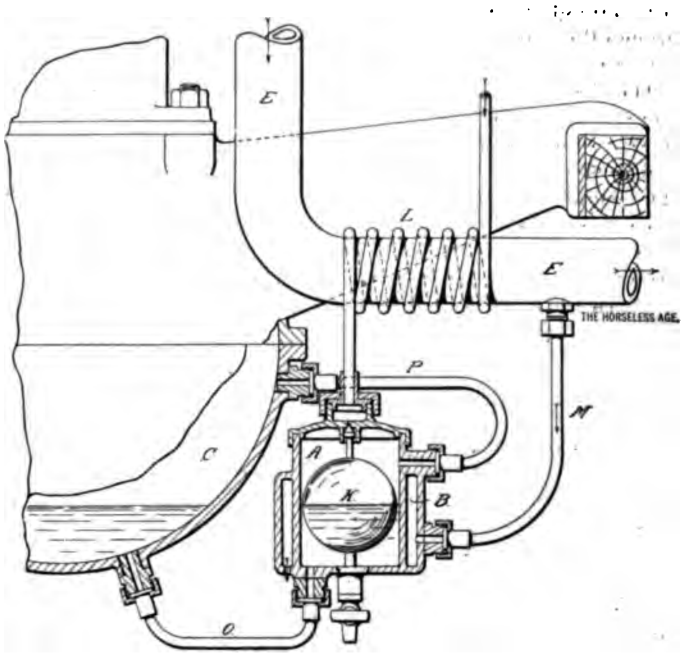


Fig. 5.—"Belgica" Automatic Lubricating Attachment.

distribution. The advantage of
s claimed for this system. Be-
e cooling water is hot the oil is
at a constant temperature,
litates its distribution during
er.

PANHARD & LEVASSOR.

y at the Panhard & Levassor
carburetor combined with gov-
tle, described in a recent issue
Horseless Age. Another im-
in recent Panhard models is a
m to reduce the difficulty of
larger motors. This cam re-
amount of charge drawn in at
nd hence the compression, and
required to start the motor by
course, reduced in proportion.
le cam referred to is the cam
he intake valve.
e firm also exhibits a water
ie honeycomb ... The radi-
is surroun... the water
tating fan ... the mo
ehind ...
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y th
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d.

It has been recognized that the multitudinous devices attached to the dashboard are arranged more or less haphazard, owing to the fact that they have been added one at a time in the evolution of the vehicle. To simplify the assemblage of devices on the dash the company have designed a lubricator which serves as support for the air gauge of the tire pump and for the voltmeter. The lubricator is automatic, being operated by the exhaust pressure; it has two feeds and is provided with a threeway valve, by means of which the oil can be fed either to the cylinders or to the crank case of the motor.

Another new feature in Panhard construction is that the levers of the throttle and ignition timer are located on the steering wheel, so that the operator may con- ... tor wi... king his hand off

...on & Bouton
... the 6 horse
...ibed and illus-
...hort time
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...r rear
...e Dion
...atter is
... of this
...ing part
... are en-
...sists of a
... carries the

hubs of the driving wheel just outside the hollow spindles by means of square section joints.

"BELGICA."

Somewhat prominent among the foreign exhibitors is the Société Anonyme Franco-Belge de Construction Automobile, of Brussels, Belgium. This firm exhibits two cylinder 12 horse power and four cylinder 24 horse power vehicles. The cylinder bore is 4.8 inches and the stroke 5.6 inches in both the 12 and 24 horse power motors. The admission and exhaust valves are made of nickel steel and are both mechanically operated. They are located on opposite sides of the cylinder and are identical in all respects, so that the cylinders might be reversed on the crank chamber and the intake valves changed to the exhaust valves if desired. The crank shaft bearings are provided with ring oilers, and their lubrication is therefore independent of the splash lubrication in the crank case. The ignition is electric, with current generated by a magneto. The motors have a centrifugal governor acting on the admission, which can be made to act either gradually or by hit and miss as desired. The carburetor is of the constant level spraying type and operates equally well with alcohol or gasoline.

A feature of these motors is the automatic regulation of the oil level in the crank case, as illustrated in Fig. 5. The crank chamber C is in communication with a float chamber A at top and bottom of the

latter by tubes P and O respectively. This float chamber is jacketed, a portion of the hot exhaust gases being led through the jacket R, through the tube M, to maintain the oil at a constant temperature. A spherical float K is located in the float chamber, having a conical valve attached on top. The oil arrives at the top of the float chamber through a tube L, which is coiled around the exhaust pipe E in order to insure a free flow in cold weather.

The change gear gives four speeds ahead and one reverse and is operated by a single lever. It is enclosed in a dustproof case and runs in a bath of oil. The bearings of the change gear shafts are provided with independent oil reservoirs, and ball thrust bearings take up the end thrust. The crowns of the gear wheels can easily be renewed when worn.

(To be continued.)

Trade Literature Received.

Advance Proofs of Winton 1903 Catalogue.—The Winton Motor Carriage Company, of Cleveland, Ohio.

Model "E" Rambler Touring Car.—Thomas B. Jeffery & Co., Kenosha, Wis.

The "Twentieth Century" Motor Cars.—The Automobile Transport Company, London (72 Comeragh road).

Tire Practice.

It is found from the Reliability Contest report that the average weight with passengers of 14 vehicles equipped with 2½ inch tires was 1,427 pounds; of 29 vehicles with 3 inch tires, 1,695 pounds; of 15 vehicles with 3½ inch tires, 2,280 pounds, and of 11 vehicles with 4 inch tires, 3,056 pounds.

N. A. A. M. Affairs.

At a meeting of the executive committee on December 3 it was resolved that a convention be called for February 14 to 21, both inclusive, at the Coliseum, Chicago, to approve the Congressional bill appropriating $20,000,000 to be expended in building a national highway.

At a special meeting of the executive committee on December 12 a special committee, consisting of J. Wesley Allison, John Brisben Walker, chairman, and M. J. Budlong, was appointed to attend to matters pertaining to the national good roads convention, to be held in Chicago during the week of the show.

Tests to determine how large the figures to be placed on automobiles should be are contemplated being made by the Chicago automobile trade, in order that the results may be incorporated in an ordinance to be presented to the city council after the holidays are over.

LESSONS OF THE ∴ ROAD ∴

In a Land of Stepping Stones.

By C. Will Travis.

It was 4 o'clock when we left the city; the machine in which we were to make the trip was a two passenger, single cylinder one of standard make, and our destination was a Kentucky town some 40 odd miles down the Ohio.

The first 12 miles of the road was a good gravel one, following the river to a point just across from Henderson, Ky., and one which I had traveled many times, but this was my first experience in crossing the river, and I naturally felt some solicitude as to what the results might be.

I had on several occasions driven to the top of the bank to watch some team and wagon embark, but had never gone down to the ferry landing. Upon reaching the top of the bank on the day in question I looked down an embankment of sand, some 200 feet in length, called a road, to the stage of the ferry landing. It was a time when the river was low, and on the other side of it rose a mountain of levee, paved with stones 10 to 20 inches in diameter and without any sign of roadway to the top, where is located Henderson, a city of tobacco warehouses, distilleries, wealth and stepping stones.

POWER REQUIRED TO GO DOWN HILL.

In descending the road to the ferry landing, through the sand, it was found so deep the machine would not coast, a case where it required power to go down hill, and the instant the power was withdrawn the vehicle would stop.

This gave rise to many speculations on my part regarding the possibilities of a successful return.

After arriving safely at the landing stage we found our ferrymen, two of whom constituted a crew of captain, pilot, engineer, fireman and deckhands, were men who would hail you from a distance and continue their salutations long after you were out of hearing. It started with: "What kind of a machine is that?" "Gasoline." "How much do you carry?" "About 5 gallons." But by this time we were aboard, and I thought the next question, "Ain't it unlawful for boats to carry gasoline?," might end the discourse and cause us to return. I replied to the effect that I thought not, but would ascertain upon reaching the other side. This had the desired effect and we were soon midstream. There was a perfect bombardment of questions on the way over, and the last thing to reach our ears as we made the ascent of that roadless levee was "Be sure to find out about them laws before you come back." And I was unable to decide whether they really knew what the law was or not.

I have been up and down a number of levees since, but none to compare in roughness or grade with this one lack of any sign of a roadway and t evenness of the paving stones ma angle of ascent dangerous; it was a go straight up, and it was a most p surprise to find we were able to n without leaving our seats. It was o complished, however, by the closest tion and by a perfect adjustment gasoline feed, and by a harmony, were, of the clutch tightness with ence to the engine speed. A deadl the clutch at any time would have all, as I have seen many times si the efforts of others to climb this l the same make of machine.

After passing through the main of the city, and upon making inq soon found our way out the Corydo The graveled part of it extends only 7 miles, and at the end of the gra would have to continue our journe dirt roads, through Corydon, Wave St. Vincent to Uniontown, Ky., whi our destination. We made good t the end of the gravel, and there jum into 6 inches or more of dust, hol ruts filled with it, as though it were which necessarily made travel slow.

Our arrival at Corydon was gree the turning out of the entire popul news of our coming their way ha ceded us by wire. The people were that met us; there were stepping or to be more correct, blocks of wo in the ground on end to serve tha pose, and stood up at such a heig our 12 inches clearance of axle refu pass over them.

The populace, to pay for the litt hibition we were affording them, w quested to lift the 1,000 pounds ove crossings made of these lines of ol tion. This they gladly did, but not out some inquiry as to whether i likely to blow up or not in the proce

WATER TANK EMPTY.

Thus we started for Waverly, 7 away, but had not covered more t miles of the distance when we fou were unable to ascend the next grad in looking for the trouble found the ator coil had sprung a leak, the wate was empty and the pump trying h keep things cool by circulating stea the engine too hot to further exert The leak, though not a bad one. have been started at the stepping b

A small wad of tire tape, held in by a bandage of the same m stopped the leak. I walked up the the nearest house where a bucket of was procured, and slowly poured i the tank, which cooled things down ciently to enable us to get to the the hill to a house, where we got water and filled the tank.

We expressed many thanks to the gave chewing gum to the little on proceeded on our way. We found W ly situated on a somewhat elevated

scape, overlooking many acres of e weed, tobacco, in the green. e found more lines of defense he entrance of the automobile, in ı of stepping blocks. The town n an elevation, the blocks were igh, and we managed to get over hout ringing the town bell for as- much to the enjoyment of the g natives, and with the loss of the finish on the under side of the)nce the sprocket, chain and com- g gear made an effort to uproot we fortunately backed off before rt resulted seriously, and well it en I found to what depth those ere planted.

ncent, 6 miles farther on, was n the dark. The settlement con- three handsome brick structures d their attendant outbuildings. cademy of St. Vincent, far back road, amidst a wealth of trees, to was lit up, while the church and on our right, stood out dark, bold nt in the light of a new moon.

lted a few minutes to inquire the l distance, and soon were again on , with only 8 miles more to go, h had to be traveled at a pace of 10 miles an hour. Eight o'clock oth machine and ourselves safely for the night at our destination, raveled in four hours 43 miles, of miles were over bad roads. We l less than 3 gallons of gasoline, no particular cause for complaint condition of either ourselves or ine.

ext day having been spent profit- Jniontown, we made preparations departure the following morning; well on our way by 9 o'clock, in Henderson before the noon id decided to remain there for The return trip had proved un- thus far, except having to bridge pping blocks.

dinner we proceeded to the ferry, descent of that awful levee was al- nerve trying as the ascent had We were greeted at the landing "Did you find out about them and when we told them that we unable to find anyone who knew nised to look the matter up upon al home, we were ferried across evee of sand, a mountain as it o us from the landing. The fact I had given that sand a great re thought since descending it ould have been willing at that time . The first effort to climb it a failure, the machine stalling ly about half way up. I refused ered assistance of the ferrymen to hoving, and requested the loan of of their fire buckets. They re- ith a newly arrived outfit, bound Kentucky shore, and I proceeded water to the top of the hill.

l to count, but take my word for it, it was a goodly number of buckets full that it required to wet down the wheel tracks until they were nearly as hard as a board from the top to the bottom, and after placing the buckets where I had been told, I started the engine and got things in shape for a triumphant march, as it were, up a sand pile. It worked like a charm, and I doubt not that a beaming countenance on my part would have told of the victory to an onlooker, had there been one.

Twelve miles of good gravel road soon lay behind us, we were home, and the machine and ourselves were receiving a much needed dusting, among other things.

From Massachusetts to Washington, D. C., in a Steam Carriage.

By A. H. P.

(Concluded.)

INCIDENTS AT WILMINGTON.

Tuesday morning, after a good breakfast, I went over to the stable and changed a wrist pin in one crosshead which had been knocking rather badly. Then, having fired up, I inquired for gasoline. A loafer, who had been watching me at work, offered to act as guide to the store, and jumped in for his first automobile ride. He very manifestly enjoyed the short drive, and patronized me to an extent noticeable even to the store man. Small boys he drove away more vigorously than an active and vicious bulldog would have done.

With both tanks now full we made a brave start from Wilmington at 9:30. It did not take us long to find that all statements as to the road's condition were underdrawn rather than exaggerated. For we struck sand and gravel and hills and stones and thank-you-mams and clay mud, and—worst of all—poor water, poor not so much for us as for the machine. For before long my boiler began to prime. One who has never pumped water into a boiler on a hot June day at the foot of a hill in Maryland, only to lose almost all in the ensuing climb, knows nothing of the possibilities of the next world. It made me wonder if I had missed the true inwardness of the jest in *Life* (I think it was), at which I had laughed—the picture of the automobilist in full regalia standing beside his machine at the gate of Hades, while Satan extends a welcoming hand, saying: "Come right in, my dear sir, and bring your machine with you."

Still down to Elkton, Md., the roads were passable, although the poorest it had been my fortune to see. This town is a shire town, and we stopped to take water by the court house. The scene was unmistakably Southern. The brick court house, the townspeople and farmers from the surrounding country, walking about in their leisurely manner, and occasionally a legal light of great dignity of mien passing by an awe silenced group. Here, on inquiring our way, we were told that we could cross the Susquehanna at Perryville by train over the railroad bridge, or bear more to the north, crossing 15 or 20 miles up the river, continuing through Bel Air, I believe.

My experience with automobile rates of any description was such as to put me on my guard. For if a wrist pin brought three times what it really was worth, the Lord only knew what a special train to carry an auto and two passengers over a bridge would cost. So I telephoned over to Perryville from the town of North East asking what the expense would be. The answer came indistinctly: "Seventy-five." "Dollars?" I asked, with a sigh of relief—I didn't dare to ask "hundreds." "No—cents!" I staggered out of the office, so overcome as to forget to pay my telephone toll, until reminded of my omission by the wide eyed lass who acted as operator. I inquired about this wonderful bridge and found it was unique, or almost so, my informer, who seemed posted, telling me that away out in Oregon there was another such bridge, these two being the only ones in the country. The railroad was given permission by the Government to build a railroad and carriage bridge over the river. The former portion was built, the latter was not. So the company was required to transport vehicles for a nominal sum.

SAND HILLS.

Leaving North East we ran into some frightful roads. Sand was deep—deeper—than I had ever seen before, unless down on Cape Cod. Finally, early in the afternoon, we came to a hill which didn't seem formidable, and in fact was not in point of grade. But the whole road, from the fringe of bushes on one side to that on the other, was a river of sand. My drivers finally stuck, and we dismounted. With 260 pounds of steam I opened the throttle, standing beside the car ready to steer. Buzz!—and I was enveloped in a cloud of sand and dust. The carriage never budged. I tried this act enough times to assure myself that Baltimore was a rapidly dwindling probability. To add to my exhilaration, an old farmer drifted across his front yard and, after watching the fun for a while, said: "Wall, my boy, I guess you'll have to give it up. Thar ain't many gits up this hill. I've seen lots of fellows turn back hyar. But if you get over that rise you'll do the rest all right." Finally I coaxed the machine over into the edge of the road and got my right hand wheels into the bushes, which were a thick growth the whole length. Then, getting the car going, I jumped in and rushed the hill, the branches pushing down under the steering wheel and giving a tread for the driver. In this way I reached the summit, taking long but fortunately good chances on stones which would have been wholly concealed if present. With a sigh of relief—and exhaustion, too, for it had required considerable hard pushing and more than considerable ejaculatory expressions to get my carriage into the bushes—I sat down in a

pretty grove of trees while my companion prepared a lunch, which we both heartily relished.

The way had been through a quiet farming country. The houses, which contrasted rather disadvantageously with those of New England, were scattered and the inhabitants few. But the tilled land itself seemed well cared for and the general impression was not of unthriftiness. Scrubby forests with some large pine groves bordered the sandy roads, up hill and down, for we were always either climbing a hill or coasting down one to the little creek which in every valley was rushing southward, drawn by its lodestone—the broad bay below. The quietness of the solitude was broken only by the hum and rumble of the seventeen year locusts, which this year were swarming everywhere. From here to Perryville the roads were still very bad, and in many places we had to walk ignominiously through the deep sand, the carriage having all it could possibly do to drag itself along. But at last, just as all hope of reaching Perryville had fled, a few houses came in sight at the foot of a hill and away for miles to the south stretched the Chesapeake Bay, narrow here, but rapidly widening toward the horizon. And the salt air and cool breeze were infinitely refreshing. 'Twas Perryville, thank God!

CROSSING A RIVER BY RAILROAD.

After a delay of an hour or so we ran the automobile upon a flat car, a feat quite easily accomplished. I couldn't help thinking what a job it would be with a horse and carriage. The wheels were blocked, the signal given and the train started. It was a decidedly novel sensation, you may well believe, sitting in a steam car, on a steam car, riding over the long trestle into Havre de Grace. The train drew up at the station, where we ran down onto terra firma again. It seemed like another country. Hard white shell roads ran through the town and were heavenly to us. We took in water and resumed our way to Baltimore.

As dusk deepened, at a curve a little country tavern appeared. It made a pretty picture, which stands out as clearly in my memory as does a scene of yesterday. The low rambling house, doors and windows wide open, showing the neat bar with the little boy and his mother acting alternately as tenders; the wide piazza, its posts and roof hidden under a wealth of climbing rose and honeysuckle, where, in the perfume laden air, lounged the riders of the three or four saddle horses tied to the railing. Surrounding all, the sombre Southern woods showed in forbidding contrast with this cheer and hospitality. How could the lemonade and cool beer and meat and bread taste otherwise than delicious? We impulsively decided to stop right there for the night and were sadly disappointed when informed that there was no accommodation. This oasis had to be left behind, and at about 9 o'clock we reached our destination. Tired? Ah! but the fight was won. We were in Baltimore. We found a hotel for ourselves and storage for the carriage, then ate supper. How good it tasted! The day had been hot and dry, and, even with dust washed off, we were both brown as Indians.

SECURED PASSAGE FOR HOME.

In the morning we took a trolley car to the wharf and engaged passage for ourselves and the automobile on the Chatham, which sailed on the following Friday for Providence, R. I. I kicked vigorously on the freight charge, which was in the neighborhood of $17, $2 or $3 more than a first class passage. It seems motor vehicles are listed in a class with a minimum weight of 4,000 pounds. So I had to pay for five times the actual weight of my carriage and see it stored with horse vehicles, which occupied fully as much space, but for which their owners were charged only a normal tariff. But all the satisfaction I obtained was embodied in the remark that they

AT THE ROCHAMBEAU STATUE, WASHINGTON.

would rather not carry automobiles anyway. So it was again up to me to apologize and crawl down off the earth.

Shortly after noon we left the automobile station, where explicit directions were given us as to the route to Washington. The road was very good for a few miles and we ran along easily. The engine was thumping from wear, chiefly in the main journals. But in spite of noise it was doing excellent work. The boiler, however, would prime on the least excuse, and on every up grade the water would drop rapidly. As Ellicott City was approached two ways offered. We stopped to inquire of a darky who stood in the door of his cabin. In backing around I miscalculated the position of the right driver and struck a large tree with some force. No damage resulted, though, and it was not until we were about to enter Ellicott City that we missed a watch, undoubtedly lost at that time. It was only a dollar Ingersoll watch, purchased in Worcester the day of our departure, which we hung on a hook [...] the steam gauge, so it hardly paid [...] back for it. One has no idea, thoug[...] a luxury it is to be free from div[...] one's pockets whenever the time is [...]

Almost directly we began the co[...] Ellicott City. This town is situat[...] deep valley through which flows a [...] some size, and, from its location [...] vironment, is decidedly picturesqu[...] approach is by a stone road, whic[...] like a writhing serpent, down th[...] hillside. At one of the curves we [...] to yield the way to a heavy load [...] drawn by eight or ten mules. [...] frightened this team here would ha[...] a serious catastrophe. Over an [...] wooden bridge, crossing the river, [...] the centre of the town, where our [...] ance created some surprise, up a sh[...] blestone paved grade, and we had [...] the crest of the opposite hill. T[...] with its double path, on the righ[...] clay, on the left of rough broke[...] evidently rolled by the lumberin[...] carts—the typical Maryland pike-[...] up and hill and down to Clarksvill[...] tance of perhaps 10 miles. Here [...] be left, and there confronted us an[...] or 15 miles of sandy, uneven road, [...] sary link in reaching the pike [...] through Rockville to Washington.

A PRIMING SPECIFIC.

This portion of the tour was a[...] trying as that between Elkton an[...] ville. The sand and red clay used [...] ter terribly fast, and the boiler w[...] most empty itself on every hill. T[...] hand pump, then another hill, and [...] belching forth of boiling water [...] creaking cylinders and inundated [...] At a little country store I obtaine[...] pint of kerosene, which I was at [...] pains to throw into the boiler by [...] the auxiliary water pump, which I [...] nected from the tank. This is a spe[...] a priming boiler I had been told b[...] fessional automobilist. I wrote th[...] ing testimonial for his old specifi[...] the inspiration of the moment: [...] fered the tortures of the damned f[...] trouble, but since using your remed[...] used no other"—and good reas[...] For the only result of treatment [...] to me was a half inch of dirty oi[...] water glass and a strong odor of [...] in the exhaust. And it seemed a [...] blow that kerosene all over the ro[...] for it had been purchased at the [...] $2.40 per gallon, 15 cents for the [...] "Things come high" if one owns [...] mobile.

It was immediately after this [...] neared the brow of a hill, up w[...] could barely crawl, that we met [...] horses drawing a carryall, in whic[...] man, his daughter and son. An[...] scramble there was! The passeng[...] fell over each other in their pa[...] course; I stopped and helped the [...] the horses by, while his sister a[...] made venomous remarks about

biles. The young lady knew "that those horses could never, in the wide world, be led by that horrid old thing." She actually felt disappointed to find that the panic was wholly unnecessary, for the horses did not seem much frightened. They went on their way, somewhat pacified, but still growling.

We passed through Rockville late in the afternoon and followed the Washington pike, which led through a beautiful farming region. It was such a relief to know the way to our destination was passable and in most places fairly good. Everything ran nicely. Our stops for water, now at a brook, again at a farmyard pump, with the whole family watching in good natured curiosity, constituted the only delay, except rarely the hand pumping, for on the better roads priming ceased, save on the severest hills. So we slipped happily along and in the early evening reached Brightwood, a suburb of the capital. We were tired and wholly strangers in Washington, so, when inquiry revealed a neat lodging in the family of the storekeeper of whom we asked information, we gladly ran the machine under an adjoining shed, and settled down to such rest as only adventures like ours can give.

SEEING THE CAPITAL.

The next day was devoted wholly to sight seeing in the city. With the directions given us by our hostess, who knew Washington intimately, we were able to see much. It took only an hour or so to drive past the public buildings. Then we gave to each a hurried inspection, although the Art Gallery, the Capitol and the Congressional Library, perforce, held us for a little longer time. At the post office letters were found from home. A sense of longing blended with our relief (for we had missed all letters since leaving), and mitigated the pang we felt at leaving our country's most beautiful city, with so little seen and so much unseen. Unconsciously, our destination had jumped a thousand miles, and thoughts and desires now centered about home.

Lest accidents occur, we made an early start the next morning, Friday, for the boat sailed at 6 p. m., and Baltimore was 60 miles away. We did not eat till well into the country. Strawberries brought from the field where a party of berry pickers, white and colored, were crouched among the vines, made, with "Force" and milk a breakfast. We had been directed another way back to Baltimore, over hilly but firmer roads, leaving the old pike a few miles out.

NO SIGN POSTS IN MARYLAND.

Had we not strayed from our course all would have been well, but, as it was, we went too long without inquiring, following the directions of "straight ahead' given a half mile back. You see, in Maryland, the penalty for displaying, causing to be displayed, allowing to be displayed, or possessing any information in regard to, a guide board, is hanging. I am sure there has been no occasion to inflict penalties under this law for some time, for I could take my oath there isn't one in the whole State. If you come to a corner, the only way is to hunt round for a farmer or go it blind. We chose the latter alternative at about the worst possible place. For down we went over the rockiest, worst rain washed, steepest hill I ever saw. Once started, there was no such thing as stopping before the bottom was reached. We hung on with both hands, until a little creek, which crossed the road, received us in its cool shelter. Water was needed, so over the hose went and in two minutes the tank was full. It was a cool, shaded nook, the winding cart path before, the steep hillside behind, and a little bird with a sweet, low song of three notes seemed to be singing to us a welcome. So peaceful and beautiful it all was, my vexation at missing the way was lulled and I almost wished I could stay there forever.

A DIFFICULT TASK.

I couldn't, so I threw the reverse lever and opened the throttle. But, hold! not so fast! perhaps I could stay a little longer after all, for to my dismay I found that both drivers were in clay mud and my wish seemed answered. The bird flew in terror at the whirling wheels, which threw mud and water into the air. My wife walked up the hill to escape the shower and pyrotechnic profanity. I got out in the brook and pushed, and pulled, and walked three time around the car, and whistled, and rolled up my sleeves and tugged, and grunted, and swore some more. And how that scenery had altered! The beautiful brook fairly leered at me with twinkling, malignant eye. The bird came back and derided me, and, to cap the climax, my wife came down the hill again and asked in the most honeyed tones why I didn't go ahead—just as though I hadn't tried till I was black in the face, before I attempted to back. I was speechless—fortunately so. But through my reeling brain came a glimmer of hope. Perhaps, now I had drawn the carriage back 2 feet or so, I might rush the brook, which I had before failed to do. I crawled onto the seat and, with shaking hand, opened the gate for the 300 pounds of steam which had collected. Slowly, coaxingly, the gate swung, and in a moment more, as the carriage started slowly, was wide open and presto! I was across on the other bank. Here, with great difficulty, I turned and repeated the rush successfully. Up the hill we crawled, "bubble" and I, wet, bedraggled and puffing, and rejoined my wife, who had again retired to where the sound of the fray came to her but dimly.

Our way resumed, everything went well except for running the carriage into a gully beside the road. This occurred as I walked by the car climbing a steep hill. I slipped and my weight threw over the steering lever and one side was over the 2 foot banking. But it was so much easier getting out, over a causeway we built for the wheels, than it had been in the brook that it hardly seems worthy of mention. Before long we rolled into Clarksville, where we resumed the pike on which we had gone two days before. The road was now easy, and 2 o'clock found us in Baltimore.

In filling my tank in Washington I had calculated on how much gasoline I should use that day, for, of course, none could go aboard the boat. When within a quarter of a mile of the wharf, and in the heart of the city, gasoline gave out. So I put in about 2 quarts, fired up and ran down to the wharf. The remainder was thrown away and the carriage left. The heat was intense, the air suffocating. My poor wife made herself as comfortable as possible at the boat office while I went up town for needed tonsorial and "haberdashorial" attention. Of the first really intelligent looking man I met I inquired for a good bar and good barber, requesting him to please observe the same sequence in his answer. He knew. "A friend in need is a friend indeed." Back to the wharf I went, feeling like a civilized being once more.

We found our stateroom, had supper and then, as the air cooled from the sea breeze, we sat lolling over the rail, watching the negroes as they ran up and down the gang plank loading the boat, their black bodies gleaming in the light of the torches. At last the boat swung off into the stream, the wind began to blow freshly, and, tiring of watching the shore lights, we retired to our snug stateroom.

When we arose from the breakfast table we were nearing Old Point Comfort. One can travel far to find a more charming scene than Hampton Roads on a perfect June morning. The boat swung up to her dock at Newport News and we, together with Judge A——— and his wife, acquaintances made on board, took the trolley car for Old Point Comfort, stopping off at Hampton to inspect the Institute, which we found most interesting. Fortress Monroe was visited, an Old Point lunch sampled, and the remainder of the afternoon whiled away in watching the bathers and that beautiful Southern scene. We took the ferry to Willoughby Spit. From there to Norfolk, where we were to rejoin the boat, was a delightful trolley ride.

In the midst of this active Virginian city there still remain many traces of the old colonial glory. Nestled between two business blocks is old St. Paul's Church, disclosing high in its vine clothed side the still open wound of a British cannon ball. In its peaceful churchyard rest entombed fair lady and proud squire, the ashes of those glorious days so long since fled. Today its commerce is wide and it is relatively of the greatest importance for the surrounding country. At the dock a line of darkies ran, like an endless chain, up the gang plank and back without a break, until, along toward 10 o'clock, there were links missing, and finally straggling groups, pushing aboard belated freight, told that we were

about loaded and ready for the 400 or 500 miles of ocean ahead.

As we began to feel the swell, and the Point Henry light showed astern, a heavy fog came up, from which we did not escape until we anchored off Beaver Tail Light, at the entrance to Narragansett Bay, on Monday morning. Then the fog lifted for a few moments, but, as the engines started, it shut down as thick as before, and gave the captain, who had not left the wheelhouse since losing Norfolk, an anxious morning crawling up the east passage. Near Rocky Point we ran out of the fog, and from there the voyage was uneventful. We docked in Providence about noon.

OFF AGAIN WITH THE AUTO.

It was 5 o'clock before we were off again. The road was familiar and we felt we were really almost home. At Pawtucket a driving tire burst, and no wonder it did, for there was literally scarcely half of the tread left, such was the punishment it had received on the poor roads. The remaining minutes of daylight were consumed in setting the spare tire, which had been carried until now lashed under the carriage. But at last we were "on our feet" again, and headed toward Worcester, passing through Woonsocket about dusk. It began to rain as we neared Millbury. I could keep only slight fuel pressure, owing to an air leak somewhere, and things went slowly. Such sleepy work it was! To fix the eyes on the path of light ahead, while the rythmical sound of the engine fills one's ears, quickly induces somnolence, fulfilling, as it does, two conditions most active in the induction of hypnosis. Twice my wife's warning cry kept us out of the bushes, for at times my eyes would close in spite of myself. Just after midnight we climbed the hill in Worcester. The city's lights below twinkled up a welcome to us, and as the engine strained over the crest the house's familiar outline showed dimly. So sleepy, so tired we were—though not for worlds would we have missed this tour. We were home once more.

In the morning we had to tell all about it—where we went, what we saw, our adventures, and all—and of course received congratulations. And in truth, as we jogged along toward home that afternoon we felt we could be pardoned some elation at our success in making this journey. To have traveled, in a low priced and necessarily somewhat crude steam carriage, almost 1,000 miles in a little over two weeks, over all sorts of roads, with only such repairs as I have related (and I omitted none), was to my mind a matter for congratulation. We had visited nine States, and as many important Eastern cities, had had a most delightful vacation, and all this at an expense for board, lodging, fuel, repairs, new parts, boat fare, freight and all—everything—of less than $150.

After January 1, 1903, the home office and factory of the Dow Portable Electric Company will be at Braintree, Mass.

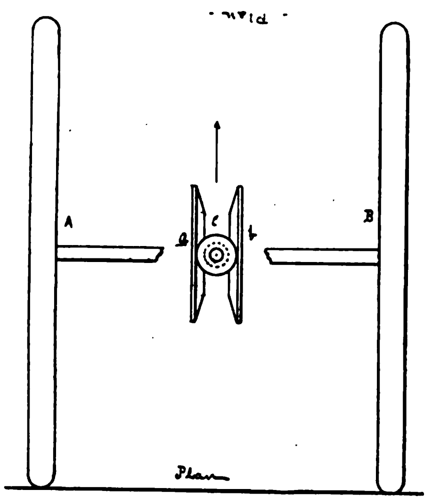
...COMMUNICATIONS...

The Question of Skidding.

Editor HORSELESS AGE:

The question of skidding is one that to me seems to demand energetic attention. There is no effect without a cause, and the two are so connected that one may be traced from the other by sufficient care and attention. There are no doubt a number of causes of skidding, and it is reasonable to suppose that some will manifest themselves more prominently when the vehicle is in rapid motion and others when it is going slowly. I have pointed out some considerations that I think have a bearing during rapid motion. By a comparison of views and experience we may surely hope to solve the problem.

Dr. Huizinga's experience, published in your issue of December 17, has suggested



to me some points that may bear consideration. While I am willing to admit that gyrostatic action would probably have but little effect under the conditions described, still I am unwilling to accept his explanation as complete. With my present experience I cannot admit that under any ordinary conditions the resistance of the forward wheels to rolling would be sufficient to cause the side slip of the same. I think for an explanation of the phenomena described by the doctor one would turn inquiringly to the compensating gear.

Suppose in the accompanying sketch A and B to be the two hind wheels, *a* the gear wheel, connected with wheel A, *b* that connected with wheel B, and *c* the intermediate gear wheel which is driven by the engine. Suppose the vehicle to be moving slowly, and that wheel A meets with an obstruction, while wheel B is free to move. If wheel A is entirely prevented from rotating, and the inertia of the engine and parts continues at the same rate—that is, if the motion of the partial point of wheel *c* continues constant, it follows that the rate of rotation of the wheel B will be suddenly doubled. In any case the effort of the engine to overcome the obstruction that wheel A has met will be exerted equally upon wheel B, which has met with no extraordinary resistance. This would obviously tend to turn the vehicle, not only because of the inertia, which we suppose small, but because of the sudden excess of rotating power applied to the wheel B.

If the axle had been solid the force of the engine would have been largely applied to wheel A to help it overcome the obstacle. If the wheels were connected with the axle by ratchets or clutches it would have been all applied to this purpose.

It might be advisable to have the two parts of the axle clutched together by a mechanism which is released by the movement of the steering apparatus from its central position. E. J. STODDARD.

Road Experiences.

BRIDGEPORT, Conn., December 26.

Editor HORSELESS AGE:

A friend of mine has a 4 horse power gasoline runabout, and finds it a handy wagon to use about town. He also goes wherever the big cars go, so far as I know. One day last summer he started for Danbury, 25 miles distant, just as the rain began to fall gently. Soon it increased to a downpour, and when he had gone half way it was a deluge, with the roads muddy and dangerous. He had to put on his low speed nearly all of the time, and consequently was obliged to fill his water tank frequently. The motor kept going in the face of discouraging conditions. When 5 miles from Danbury it stopped, and the machine was easily pushed into a wayside barn. My friend is a good mechanic and he had another good mechanic with him. In ordinary hands it is doubtful if the trouble would have been located without a trip to the repair shop; but they worked for an hour, and finally discovered that the pin holding the spring to the intake valve had been sheared off. A small nail was quickly found, and again the motor cheerily "moted."

It was so dark then and the rain so heavy that it was decided to return to Bridgeport. This was done, over roads that ran with mud and water, requiring the use of the low gear almost all of the time. Still, the plucky little machine pulled home without a waver.

Often the most natural reason for the stopping of a gasoline motor is left till the last in examining a machine. My friend started out once to give a lady a ride. She had never before been in an automobile, and he was anxious that the machine should show off its best paces. Of course, the motor was cranky. He started from home and before he had gone far the carriage came to a standstill. A little elbow work and she started again. The lady got in and prepared for a nice ride; but the machine had gone but a few feet when it again came to a stop. Then my friend

· the repair shop, and the wise ıt establishment peered into the knowingly. Various reasons ;ned. The spark plugs were .e vibrator examined and gaso- :d into the cylinder. Still, she ırt. After three-quarters of an ɔme thought to look at the bat- sure enough a broken wire was hen the motor in glad relief /fully and ran like a top the rest

:ll known among automobilists ·uction and luck are about the important things to consider ssing the reliability of the aver- e. It is unfair to judge the ma- xperiences from one man's do- ıpenings. He may have one un- to count against a month of

ınce, during the Danbury fair :r, that brings people from all :cticut and Western New York, mobilists drove to Danbury in ıobiles. Many got there without returned the same way. I hap- ɔ 3 miles all right, and the fact not get any further was clearly mine.

cold morning and the 7 horse line car had been housed in an So cold was the vaporizer that about an hour of good hard · get everything warmed up and :xplosion. The engine ran well ;, when gradually the car came What seemed strange was that was running as blithely as ever › notion of stopping. I got out ıte the mystery, and was some- ised to see the sprocket on the going round and round, but the t stirring. It showed, of course, ıing serious was the matter, and ıo getting to Danbury by auto-

more than half a mile to the road station, where, fortunately, ı acquaintance. He hitched up o the stalled machine, where my had been left on guard. We nbury by rail. In the meantime honed to the Bridgeport repair towing machine. I left a white ıld farmer to watch the machine. ·essed a quarter into his hand with great earnestness that no touch the machine, and seemed tisfied with the tip. The repair d within an hour, and the old ıe effrontery to say that he had id for his trouble. They there- him half a dollar, to be charged ıf course.

ıund that the sleeve connecting ifferential gear had twisted off, ly an eighth of an inch thick, ıuld have been of greater thick- ıs told at the factory that sev- ıes had come back because of which had not been noticed in putting the machines together. It may be seen that the manufacturers have not reached a stage of development where they do not leave the testing of the construction to the purchaser.

I figured that my trip to Danbury of 25 miles and back, instead of costing merely 60 cents for gasoline consumed, in reality cost as follows:

Railroad fare for two, $2.50.

Towing machine to repair shop, two men and extra machine, $6.30.

Taking off hind wheel, etc., $4.50.

Putting in new sleeve, $3.

Man to watch car, 25 cents.

Telephone, 10 cents.

Total, $16.65.

Everyone will agree that I was not at fault, as the machine was quite new and had not been run hard. The manufacturers acknowledged that it was a defective piece of workmanship, and did not charge me for the parts supplied, or I would have had $7.50 more charged to my account.

I say speed the day when a moderate priced car of from $700 to $1,200 will be made of such material and in so workman-like manner that accidents such as the above will be eliminated. It is progress along reliability and not speed lines that the majority of users are hoping for. The manufacturers may be willing to duplicate any part that is proven defective, but that is sometimes but a drop in the bucket. The repair man's charges for replacing the part when furnished is what makes a bundle of greenbacks look like cast-off fish bait.

I do not mean to say that an experience of this kind has affected my faith in the ultimate success of the motor car, nor impaired my regular enjoyment of the sport. This was the only serious holdup that I had with the car. I take it that we gain more information by the exchange of our unlucky experiences than we do by detailing those which were strewn with roses and honey, and which are usually the rule and not the exception. F. W. BOLANDE.

Explosive Engine Queries.

Editor HORSELESS AGE:

Is the M. E. P. in a four cycle motor generally stated for the expansion stroke alone or is the actual mean pressure of the expansion stroke divided by 4 after deductions for negative work? The M. E. P.'s under "Data of Modern French Motors," issue December 10, appear to me very low on one basis and very high on the other.

Is combustion more rapid as speed of expansion increases?

Is the heat of combustion affected by the heat of compression? That is, would cooling the compressed charge at constant pressure lower the combustion temperature? J. R. BLAKE.

[The M. E. P. always designates the mean effective pressure during the power stroke only; so that if the M. E. P. is multiplied by the area of the piston head in square inches, by the length of stroke in fractions of a foot, by the number of power strokes per minute, and this divided by 33,000 the indicated horse power of the engine is obtained. In the table, "Data of Modern French Motors," the horse power was assumed to be the indicated horse power and the M. E. P. was calculated on that supposition. As, however, the horse power, in most cases at least, undoubtedly represented the brake horse power, the figures given in the M. E. P. column do not represent the actual mean effective pressure, being less in the proportion of the mechanical efficiency factor of the motor to unity. The figures in the M. E. P. column were intended for use only as a means of comparison.

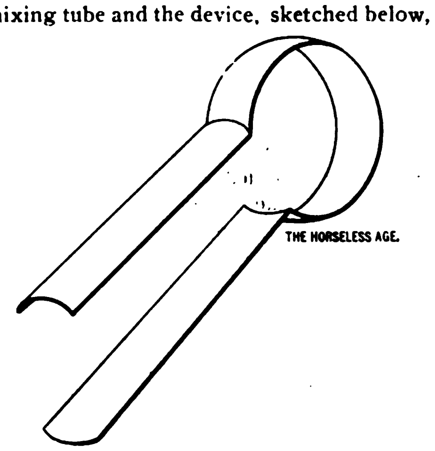
The rapidity of combustion depends upon the compression; consequently, combustion would be completed more rapidly if effected at constant volume than in a cylinder in which expansion takes place during the period of combustion, provided the original compression was the same in the two cases.

We are not quite certain whether the temperature of combustion is completely independent of the initial temperature. In calculations of the temperature of combustion of different fuels the initial temperature is never considered.—ED.]

To Overcome Whistle in Mixing Tube.

Editor HORSELESS AGE:

I had a chronic case of whistle in the mixing tube and the device, sketched below,



overcame it. It was made of thin brass and was snapped into the mixing tube after firing up. Above is in answer to your request on page 698, last issue. J. P. B.

At the reunion dinner of the participants in the Reliability Run of the Automobile Club of America at the New York Athletic Club, as briefly reported last week, the following toasts, proposed by W. E. Scarritt, were responded to: "The Automobile Club of America," President A. R. Shattuck; "The Reliability Contest," John A. Hill; "The Contestants," Percy Owen; "The Observers," C. H. Gillette; "The Press," Angus Sinclair; "Free Lances," W. J. Stewart, E. E. Britton and J. Dunbar Wright.

NEW VEHICLES AND PARTS.

The Russell Gasoline Car.

The two cuts herewith represent a gasoline automobile designed and built by C. W. Russell, of Springfield, Ohio. Fig. 1 is a general view of the machine and Fig. 2 a view of the frame with the machinery in place. The vehicle is a medium weight, and has a single seat for two, although a tonneau seat can be placed on the rear if desired.

FIG. 1.—THE RUSSELL GASOLINE CAR.

The frame which supports the motor and the mechanism is constructed of a rectangular steel tube $1\frac{1}{4} \times 2$ inches by one-eighth inch wall. The sides and ends of the frame are made of a single tubular bar. The crossbars are secured to the main frame bars by angle brackets. The vehicle has a live rear axle of $1\frac{1}{2}$ inches diameter, which is mounted in four "American" roller bearings of large size, one on each side of the differential gear and one just inside of each of the rear wheels.

The differential gear case, the housings of the roller bearings, the T sockets and the king bolt head castings are all of steel and are brazed to the rear axle tubes. Two tubular reach bars extend from the rear axle to the front, and have a swivel connection with the front axle of the centre. Wire wheels are used of 34 inches diameter, both in front and rear, shod with $3\frac{1}{2}$ inch Goodrich clincher tires. The wire spokes of the wheels are exceptionally heavy, and the rear wheels contain fifty-two spokes. Both front and rear axles have a truss rod running below them.

The motor is a single cylinder, horizontal, four cycle, high compression type, developing 9 brake horse power. The speed is variable from a very low limit to 950 revolutions per minute. The cylinder and the lower half of the crank chamber are cast integral, and the upper half of the crank chamber is an aluminum casting The water jacket is made of sheet copper, and is so affixed to the cylinder casting as to be absolutely tight. The cylinder head, which forms the explosion chamber, is a separate casting, and can be removed from the cylinder by taking the four nuts from the retaining studs. The cylinder head is fitted to the cylinder in such manner as to require no packing.

The inlet valve is arranged vertically and in line with the exhaust valve, and by turning a thumb compression stud, and a check nut thereon, the dome and inlet valve chamber can be taken from the valve seat, in case the valve requires inspection or regrinding. The inlet valve is provided with a control mechanism forming part of the valve chamber. This control mechanism is positively connected to a handle on the steering wheel, working on a quadr
means of which the driver may con
speed of the motor.

The exhaust valve can be r
through the opening of the inlet valv
the collar against which the exhaust
bears has been removed. The
valve is operated by a rocking arm,
in turn is operated by a cam on t
speed shaft.

The circuit breaker, located at t
of the half speed shaft, is enclosed
aluminum case. The case can be r
by depressing a retaining catch, a
circuit breaker itself by taking ou
taining pin.

The cooling water is circulated b
tary pump of the gear type, moun
rectly upon the half speed shaft. Fr
water jacket the water circulates thr
6 gallon copper tank and through
diator coil. The radiator is hung fr
frame in front, and consists of twen
small copper tubes, surrounded by
corrugated copper disks, three-eigh
apart. These tubes are soldered
light brass head plate. An alu
header, with compartment chann
every second tube, is bolted to thes
head plates. An advantage of th
struction is claimed to be that by
ing the aluminum header the radiato
can be easily cleaned, which is im
with the conventional form of ser
radiator coil.

The gasoline tank is placed in th
in the rear, opposite the motor;
sufficient capacity for one supply
for 150 to 200 miles. A float in
shows the amount of gasoline ren
in the tank at any time. The car
is of the float feed spraying type.

The change gear is of the planetar
giving two forward speeds and o
verse, the gears being entirely out

FIG. 2.—CHASSIS OF RUSSELL GASOLINE CAR.

A, top of motor; B, aluminum crank case; C, balance wheel; D, dynamo; E, dynamo b
spark coil; G, storage battery; H, gasoline tank; I, water tank; J, cooling coil; K, enclose
able speed; L, change speed lever; M, steering wheel (aluminum and rosewood); M", trip
throw wheel forward; N, circuit braker control handle; O, inlet valve control handle; O",
rants for N and O; P, emergency brake lever (foot lever controlling two brakes not shown
cut); Q, roller bearing and oil inlet for gears; R, differential casing; S, muffler; S", cut ou
to muffler; T, emergency brake shaft; U, McCanna force feed oiler; V, end of shaft for s
crank; W, distance rods for sprocket chain; X, strut or brace rods for front axle (same
axle; Y, steel tube reaches—sub-frame; Z, main frame.

n the fast speed, the motor in riving the rear axle directly roller chain. All the gears are of steel and bronze, and run main gear shaft runs in roller ll the speeds are controlled by er. The car is geared to run miles per hour.

ing mechanism comprises a orm wheel sector. The steer- mounted in two bearings in a ring post column, and carries end an aluminum wheel with a n, the wheel being attached to a special joint, which allows ped forward when the driver ar. The steering column and s are nickel plated. The vehi- ided with three brakes—two actuated by pedals, and an rake acting directly on the rear e cylinder and all the motor well as the gears, are oiled by multiple pressure oiler.

dashboard cabinet is divided artments; one contains a water e other the dynamo, charging the spark coil, all in view of through a glass panel. A is also provided in this cabinet e storm aprons and starting upholstering is of hand buff bound on body with silver trimmings, and cushioned with prings and white hair. The finish of the body are a deep ribbon panel of rich red. The r is of the same color as this striping is of black, with gold The body can be removed from me in a few moments by tak- bolts.

v Thomas Touring Car.

. Thomas Motor Company, of Y., have brought out a new ich will be known as Model 17. ger and heavier carriage than vehicle was, and has a larger, table and substantial body.

l base of this car is 78 inches d 56 inches. The wheels are ery type, with fourteen spokes, d with 28x3 inch single tube nt the wheels run on ball bear- e drivers are keyed to the spin- rear axle. The body springs full elliptic type and of gener- There are no reaches, so that gear may accommodate itself sses of the road surface with- subjected to excessive strains. is of the "armored" type and The engine has a single hori- der of 4¾ inches bore and 6 e. It is located under the body e rear, and is rated at 8 horse rmally it makes 600 revolutions By adjusting the mixture and he spark the motor's speed can ccelerated. The change speed gear is of the sun and planet variety, and gives two forward and a reverse speed. The sprockets are of such relative size that the motor makes three and one-half turns to one of the driver's on the high gear. The balance gear is of the spur gear type, and has six pinions. The rear axle is of larger tubing than was formerly employed, and is equipped with a truss. Some improvements have been made in the cooling system. A larger radiator has been fitted than was formerly used. It has twelve three-quarter inch tubes about 2 feet long, and fluted iron disks, which are soldered and tinned when assembled. The circulating pump is driven positively by the engine crank shaft. Ignition is by jump spark and (six) dry batteries. The gasoline tank holds 6 gallons of oil, which, it is claimed, will drive the machine 100 miles or more. The tank is of copper and is located under the boot in front. In the water tank 5 gallons of water are carried. This tank is situated under one of the front seats.

New Thomas Touring Car.

A number of changes have been made in the control devices of this vehicle. The steering lever has given way to a wheel and the change gear lever is now secured to a small shaft that is held in bearings that are secured to the steering column. Two thumb levers are provided to time the spark and throttle the mixture. There are two levers located below the level of the seat and inside the panel to relieve compression and control the admission of air, respectively. One of the foot pedals applies the double acting band brake on the differential drum, and the other controls the reverse.

The body has individual front seats and a detachable tonneau. The back rests and the door or gate are high; the object being to give comfort and afford protection from dust. All cushions are covered with tufted leather. The body is secured to the frame by means of four bolts. The mud guards are of aluminum. The car weighs 1,200 pounds, and it is stated that it is capable of a maximum speed of 25 miles per hour on the level road.

The Westinghouse Automatic Circuit Breaker for Charging Storage Batteries.

The Westinghouse Electric and Manufacturing Company have brought out a circuit breaker which automatically opens the charging circuit of a storage battery when the voltage across the terminals thereof has reached a predetermined value; in other words, when the battery is fully charged. This device then permits of charging an automobile battery from city circuits by simply making the necessary connections when the charging is to begin.

The device comprises a switch and a coil for releasing the switch. The resistance of the coil, and consequently the current flowing through it, depends upon the temperature of the coil, and an adjustment is provided to allow for temperature variations.

The instrument is made in two varieties. One of these, which is designed for batteries of ten to twelve cells, has only a single coil, while the other one has a double coil, the halves of which can be connected either in parallel or in series to make it suitable for batteries of twenty to twenty-four and forty to forty-four cells, respectively.

For a convenient adjustment of the point of cut off the device is graduated in volts, and is calibrated at the working temperature of the coil. When cool the release will take place at a lower voltage than indicated by the graduations, so that if the charging circuit has been unused long enough to allow the circuit breaker coil to cool off, it is temporarily adjusted at a high enough cut out voltage to insure closed circuit for about twenty minutes, by which time the working temperature has

been attained and the coil can be permanently adjusted to open the breaker at the voltage predetermined for "full battery." If the circuit breaker is in continuous or nearly continuous use this preliminary setting is, of course, unnecessary, and resetting is required only when a change takes place in the number of cells to be charged.

The time available for charging is usually enough to admit of the use of a relatively low rate, in which case the battery will be as full as can be desired before the circuit breaker cuts out, but the use of the circuit breaker also offers a special advantage in case where the utmost rapidity is required in charging, for the device cuts out at the predetermined voltage whatever the charging rate, although at very high rates the predetermined voltage is attained when the battery is still incompletely charged. The cutting out of the circuit breaker under these circumstances makes it possible to continue the charging at a lower rate for the remainder of the available time, or until the breaker cuts out again.

For lead storage batteries, the circuit breaker is set to release at about 2.55 volts per cell of battery to be charged. For example: For a twenty cell battery the circuit breaker should be set at 51 volts; for forty-four cells, 113 volts; for forty cells, 102 volts. The temporary setting required when starting with perfectly cool coil should be roughly about 10 volts higher in each case.

The Marble-Swift Transmission Gear.

The Marble-Swift transmission gear is a friction disk drive in which the usual arrangement is reversed, the power being transmitted from two friction wheels A and B, sliding on a shaft C. A keyway is milled in this shaft for the entire length and a key fastened in the bore of the friction wheels slides in this keyway.

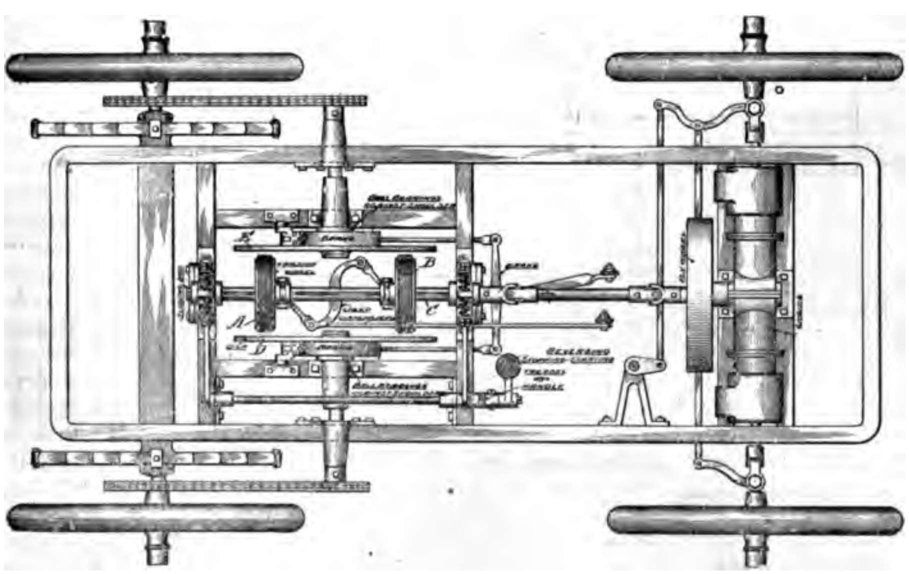
These friction wheels are controlled by a speed changing lever, which causes both wheels to move a uniform distance from the centre of the disks D and E, so that each disk will be driven at the same speed. Shaft C is driven direct from the motor, being controlled by a flexible shaft or tumbling rod and knuckle joint connections. Shaft C is also supported at each end in a sliding journal or box, thereby giving the friction wheels a sideway movement, in order to engage the opposite sides of the opposed disks.

The arrangement of the starting and reversing lever throws shaft C with the friction wheels A and B in opposite directions. For a forward speed a slight movement of the starting lever throws the front end of shaft C, so as to engage friction wheel B with disk E, at the same time throwing the rear end of shaft C, causing friction wheel A to engage with disk D. For a reverse speed a slight movement of the starting lever in the opposite direction causes friction wheel A to engage with disk E, at the same time causing friction wheel B to engage with disk D. Any speed may be obtained by operating the speed changing lever, which moves the friction wheels uniformly to and from the centre of the disks.

As shown in cut a double chain drive is used. The gear is claimed to perform both the functions of transmitting and compensating, thereby obviating the necessity of a divided or sleeve axle.

A double brake, one for each wheel, is part of each gear and is used as an emergency brake, as a slight movement of the starting lever in the opposite direction is used for ordinary braking. This method of braking keeps the engine from racing or running away when reducing the velocity of the vehicle.

The device is marketed by the Marble-Swift Automobile Company, Monadnock Building, Chicago.



VEHICLE WITH MARBLE-SWIFT TRANSMISSION GEAR.

The New Stearns Model.

The new Stearns gasoline touring car, of which a number of illustrations have appeared in recent issues of THE HORSELESS AGE, is equipped with a 24 horse power two cylinder, horizontal motor. The change gear gives three speeds forward and one reverse and a direct drive to the live rear axle on the high gear. The vehicle has an 8 foot wheel base, standard tread, and 34 inch wheels. It has two independent brakes, one acting on the differential and the other, a double brake, on drums attached to the rear wheels. The spark coils, oilers and circulation indicator are fastened to the dashboard, and the battery is located at the side of the frame. The gasoline and water capacity is claimed to be sufficient for 200 miles.

The body is designed for six passengers, the tonneau seating four. It is pointed out that the latter has no door seat. The vehicle has spring upholstery and a single or divided front seat. A speed of 40 miles per hour can be attained, it is claimed.

The Riley & Cowley Steam Car.

At the shops of Riley & Cowley, South Brooklyn, N. Y., a heavy steam touring automobile is being completed. The machine is being built to the order of B. M. Whitlock.

This carriage, when finished, will resemble a high powered, foreign gasoline touring car in general appearance. It is intended to carry two passengers only, and will weigh about 4,000 pounds, including supplies. The wheel base is 8 feet 6 inches and the gauge is standard. The wheels are of the "wheel within wheel" pattern and are shod with 32x2½ inch Stevens indurated fabric tires. An aluminum bonnet will cover the boiler in front. Flames from the burner cannot reach inflammable material. All the body suspending springs are 39 inches long and 3 inches wide, and have eight leaves each of a thickness of ¼ inch. The springs are oil hardened and are of the semi-elliptic type. All the machinery, including the differential, is secured to the frame, side chain drive having been adopted. The frame is built up out of two steel channels, which are joined together in the middle at the front and rear. The size of channel employed is 4x2½x¼ inches. The cross pieces are angle shapes of 4x4 inches. Both axles are of solid steel, are 2 inches square and have no welds, i. e., they have been forged from solid billets. The wheel bearings are plain and are bushed with hard brass.

The boiler is of the fire tube variety. It is 18 inches high from crown sheet to crown sheet, and has 520 ⅝ inch seamless steel tubes. The fittings are attached to the rear side of the boiler in plain view of the operator, and no mirror is required to reflect the water level. The flues have been ingeniously arranged. There are two of them, both in front of the steam gen-

which extend downward and ter-
n flue tubes of the same rectangular
running along the outside of the
the extreme rear. In front these
ive mouthpieces for admitting air.
er are reduced in section further
increase the velocity of the air
which suck the burnt gases out
furnace. The faster the vehicle
he greater the induced draft.
ngine is a vertical compound with
ion, and has a crank case of sheet
Splash lubrication is employed.
nders have a bore of 3 inches and
, respectively, and a stroke of 6
With 150 pounds of steam 12
orse power are said to be devel-
d with 300 pounds 15 brake horse
The sprocket on the engine shaft
ity teeth and drives a thirty tooth
on the countershaft. An Upton
ed gear, running in an enclosed
located on this shaft, as is also the
ial. To reverse motion the en-
eversed. Thus there are two gear
ackward as well as in the forward
. A small pinion on the counter-
shes with a large gear (6 to 1 re-
, which drives the boiler feed
The latter is of 1½ inch bore
ich stroke. The air pump is also
acting and driven off the cross
the former. The stroke is the
d the bore is 2 inches. A pressure
ounds is carried in the air tank,
s a solid drawer (Janney-Stein-
eceptacle, 30 inches long and 6
n diameter. The tires of the ma-
e filled from this tank, a special
id connections being provided for
pose. Victor auxiliary air and
eed pumps are fitted. When the
is at rest the positively driven
annot be worked, and the auxiliary
ire then called on. The fuel tank
gallons, is solid drawn and is lo-
the extreme rear. The water tank
l in the body. Its capacity is 110
gallons. All the piping, with the exception of the live steam and exhaust pipes, is of brass, and screwed into and soldered to fittings. There are two brakes—a steam and a foot brake. The former is of the Raymond type and acts on the drums, which are secured to the drivers. Each strap is applied by a 2 inch steam cylinder. The other brake is actuated by a pedal, and grips the brake drum on the countershaft.

Steering is by means of a 16 inch wheel on an inclined column. The reduction is by means of a worm and nut. All the valves are located below the footboard and grouped around the steering post, and are, therefore, readily accessible. When completed the car will weigh about 4,000 pounds.

The Brennan Touring Car.

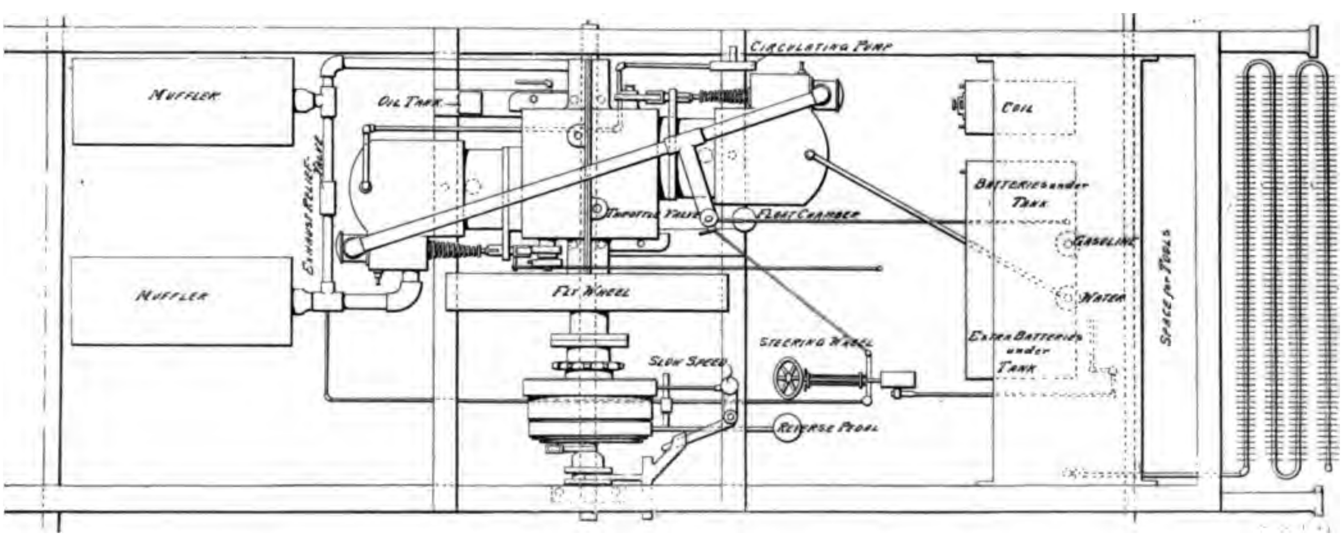
The accompanying drawing represents a plan of a touring car equipped with a Brennan 15 horse power, double opposed cylinder, horizontal motor. The car complete weighs 1,950 pounds. The running gear frame is made of 2 inch angle iron, and is suspended on semi-elliptic springs, through the intermediary of spring shackles. The motor is mounted on crossbars of the frame, also made of 2 inch channel iron, the channel being one-half inch in depth. The crossbars are so constructed as to bring the base of the motor 9 inches below the angle iron. The crossbars are spaced 20 inches apart, so as to provide plenty of room for the flywheel, and are reinforced by longitudinal ties of 2 inch channel iron riveted and brazed. This is claimed to make a light and rigid frame for carrying the motor.

The motor is of 5 inches bore and 5 inches stroke, with a compression of 85 pounds, and claimed to develop 15 horse power on the brake at 800 revolutions per minute. The motor is lubricated by means of a pump forcing the oil into the crankcase, it being allowed to return from the bottom of the crank case to an oil tank, which is shown in the drawing as located on the left of the motor, on the rear crossbar. Both of the cylinders are supplied with mixture from a single carburetor of the float feed type. The admission is controlled by means of a throttle valve, which is operated by the driver by means of a small lever on the left of the steering post. On the opposite side of the steering post is located a lever for operating a cut-out valve on the muffler connection.

Ignition is by jump spark supplied by dry batteries. Two sets of batteries are carried under the bonnet and front of the dash. The batteries are located underneath the water and gasoline tanks, and the spark coil is also placed in this compartment. The trembler is located on the right hand side of the motor between the flywheel and the crank case, and is connected to a foot button near the dashboard. The spark may be advanced by pressing on this button with the left foot. When the foot is off the button the ignition timer automatically resumes the position of latest ignition, and in case of accident the motor speed will therefore be reduced automatically. Another advantage is the avoidance of all danger from a back kick in starting the motor.

The transmission is of the sun and planet type, the slow speed and high speed clutches being controlled by one lever, which in its forward position secures the low speed and in the backward position the high speed or direct drive. The slow gear gives a reduction of speed over the high gear of three and one-half to one. The reverse is operated by the foot lever, placed under the heel of the operator's right foot. It secures a reduction of speed of four to one. Most of the operating levers are fulcrumed on one of the crossbars of the frame.

The two tanks are connected to each other by flanged ends, so as to leave an air space between them. The gasoline tank is located on the left and the water tank on the right. The water is circulated by means



Plan of Brennan Touring Car.

of a geared pump which draws it from the radiating coil, forces it into the motor jacket at the top, from the bottom of which it returns to the tank. The jackets of the opposite cylinders are connected by a one-half inch pipe, insuring that the water circulates through both cylinders. The pump is located to the left of the motor, being supported on one of the crossbars of the frame, and driven by a chain.

The Remy Magneto Oscillator

The Remy Electric Company, of Anderson, Ind., have recently brought out a magneto oscillator for touch spark ignition, which is claimed to be radically different from American ignition apparatus heretofore on the market; it is somewhat similar in appearance to the familiar magnetos, excepting that it is larger and has a spring mechanism at one end instead of a pulley for driving. The company furnish the following description:

The current is generated by an oscillating motion of an inductor. The movement is produced by a spring, which has just previously been strained by a cam and instantly released. The inductor is a simple iron casting shown by dotted lines. The magnets used in the construction of the oscillator are made from English magnet steel. The only wire used in the construction of the machine is in two taped coils, which lie imbedded in its field castings. The coils are connected together, making one coil electrically, one end of which is grounded or connected to the frame, and the other connected to the one binding post of the machine. Spark coil, starting battery or switches are not used in connection with the oscillator, and the one binding post connects direct to the insulated electrode in the engine. A small rod connects the inductor arm of the oscillator with the movable electrode in the engine, and the

one movement causes the separation of the electrodes. It is evident that the same size spark is generated when starting the engine or running at full speed.

The Duryea Doctor's Vehicle.

The cut herewith shows a four wheeled Duryea gasoline carriage entirely enclosed, with a view to all the year around use, and particularly for doctors. It will be noticed that the top has windows all around. The vehicle is otherwise the same as the standard Duryea models, comprising the latest improvements, viz., a simpler steam condensing water tank, a more springy support, a more reliable lubricating arrangement and a governed spark advancer.

THE DURYEA DOCTOR'S VEHICLE.

In the Lower Berkshire Hills.

By G. L. Hurd, D. D. S.

Many of my friends were "stuck" in the purchase of their "first horse," unless they accepted the advice of someone who knew about horses (other than a dealer). The same can be said of the automobile.

My first machine was a double cylinder, air cooled motor, with machinery underneath the body, on the gear. Carrying space in the body was a great inducement to one who had always had to find storage for horse blankets and tie straps. The manufacturer came with it to demonstrate; but it couldn't run more than a mile without the cylinders heating and expanding sufficient to stop the engine. The vibration was so great that bolts and nuts jarred loose in the attempted demonstration. I refused to accept the machine, and fortunately secured (through my attorneys) the return of a portion of my deposit, which the manufacturer had had the use of for about four months, promising about each week of the time to "deliver in a few days."

FIBRE GEARS IN HILL CLIMBING.

My present machine—the third one—has been very satisfactory indeed. It has a single cylinder, four cycle gasoline motor of 4½ horse power, water cooled, and with circulating pump, starts from seat, and weighs with top 880 pounds. I have run it about 1,800 miles this past summer, and have had but little bother with it. One point, however—manufacturers should not send out fibre gears for hilly sections, and all machines are liable to be called on for hills any time. I ripped them in short order, and others to my knowledge had similar experiences. The bronze gears have worked faithfully, and the little machine has never failed on a hill, and it has taken two of us up some pretty tough ones. We live in the continuation of the Berkshire Hills, so that a machine has some severe trials that it would not be subjected to in other localities.

I have had some tire troubles—three punctures—but three umbrella plugs, placed by myself, are doing good service in the two front tires. All four leaked around the bolts, but after introducing some "Anti-Tire" leak fluid they do not require pumping up once a month, and I am of the opinion that if I had used it at first all three punctures would have healed themselves.

THE COMMUTATOR

is subjected to too much dirt and oil, so I covered same with a piece of rubber cloth (simply tying it around), and have not missed an explosion from that cause since.

I have not found four cells of battery of long enough duration to continue a good spark; but by running on four new cells, and adding one more occasionally to the same circuit, which I can do in three minutes on the road by simply changing the wire in the binding posts, I have had splendid results, obtaining a mileage of about 700 miles from the eight cells with a good, rich spark, and as one expressed it "with fire to burn," and one-quarter turn will start the engine easily. The vibrator may need

usting for every other cell that

ASOLINE TUBE BREAKS.

ne four day trip we noticed a
line odor, and upon investiga-
that the brass tube conveying
e to the mixer was broken. It
summer day and a long way to
Vith some tire tape I so repaired
twenty minutes that it worked
he next town, where soldering
er made it as good as new. I
s carried a piece of rubber tub-

PARTIALLY BROKEN WIRE.

not been "drawn in" by horse
Once I was obliged to leave
over night and come home with
ng unable to discover a partially
ered wire in the electric circuit.
fully broken I would have had
and could have located the
fact, it took an expert over an
ext day to find it, and I didn't
en after all. These things will
ppen, however, on occasions
have a good congregation of
ls, who ask you which you pre-
to or a horse. It is sometimes
cult to locate the "trouble" un-
circumstances, if you are at all
be nervous.

THE EMERGENCY BRAKE

cted to the lever by a wire cable,
altogether too much stretch. It
straight iron rod—a neat job by
—which doubles the value of the

een (and am) a great admirer
se, and have had several good
sold them this last spring and
uto instead. I have made more
d at much less expense than I
ibly have done with a horse.
sumption of gasoline has been
llon to 25 miles. A sixteen year
oy cares for my machine, and it
ittle of his time.

AIN FOR MUDDY HILLS.

m rain does not bother much,
ozen road just thawed from
ng sun makes hills slippery—a
ce chain for lifting drafts (4 or
ard) wound around the tire, rim
ll take hold, though.
overed 35 mile runs and return
d had six hours to spend at the
ith perfect ease and without fa-

I am prejudiced in favor of the
gine, but it is because I have seen
f steam. This is a great country
s to pass through, and I have
the steamer that did not need
irs here. Possibly they did not

try driving for several years to
e horses will be afraid of the
, therefore starting the engine
eat is an exceedingly important
can stop my carriage and engine in ten seconds and allow a horse to meet me and pass, and be off in five seconds, without changing position. I have observed many times that the auto driver who has to get out to start his engine will compel a horse to pass with the engine running, with the result frequently of a scared horse and perhaps not unjust criticisms on the auto man's head.

Book Review.

"Motor Cars and the Application of Mechanical Power to Road Vehicles." By Rhys Jenkins. With 100 illustrations. London: T. Fisher Unwin. New York: James Pott & Co. 1902.

The book is chiefly of an historical character. Of the 353 reading pages 159 are devoted to the early history of the automobile. The author states in the preface that chapters 2, 3, 4 and 5 are based upon a series of articles contributed to the *Antiquary* in 1896. These chapters contain perhaps the most complete history of automobiles prior to the great revival in 1894 and 1895 that has yet been published. They are replete with illustrations of contrivances for mechanical and hand locomotion invented during the last three or four centuries. The historical chapters are the most satisfactory of the book, the description of modern cars being confined almost entirely to English productions, and not very satisfactory at that. These descriptions are essentially popular in character, comparatively few line drawings being used and nearly all illustrations being outside views of the vehicles.

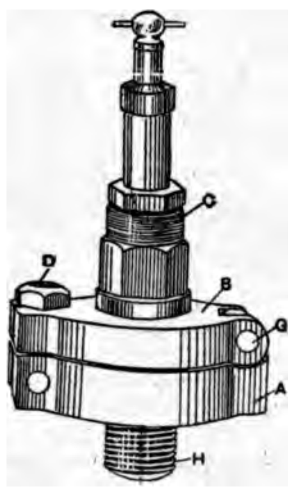
Of American gasoline cars the Duryea and Olds are described at some length, particularly the former. In continuance of the description of the latter it is stated that the Pierce, the Haynes-Apperson, the Buffalo, the Rambler and many other American light cars are built on the same general lines as the Oldsmobile. This certainly is far from true as regards the Pierce and the Haynes-Apperson. There may have been much copying in the American automobile industry, but it certainly has not been carried to such an extent that American cars can be described in such a wholesale manner. A very good chapter is devoted to motor bicycles, but, of course, practically all the machines described are of English manufacture. In the chapter on steam cars five pages are devoted to a description with illustrations of two American steamers—the Locomobile and the Grout. The chapter on electric carriages is very short and contains only a single illustration, that of a four seated landaulette of American manufacture. One chapter is also devoted to motor wagons and vans, and another to the War Office trials of such vehicles.

The book is printed on heavy paper, and with few exceptions the cuts and typography are excellent. The exceptions are cuts, which have evidently been taken from other sources.

...OUR... FOREIGN EXCHANGES

A New Spark Plug Attachment.

The accompanying cut represents an attachment for spark plugs designed to admit of examining a plug in situ, and making any adjustments without disturbing the plug or its connections. The device is the invention of Archibald Ford, of Liverpool, England. As will be seen by the illustration, the attachment consists of a plate A, which is fixed to the cylinder by means of the screwed boss engaging in the usual sparking plug aperture. Hinged to the plate A is a second plate B, which may be turned outward, on the hinge, exposing the sparking plug points and admitting of any necessary cleaning or adjustment. In the recessed part of the flange A a suitable packing washer is placed to form a gas tight joint, which is maintained by the slight boss on the inside face of B engaging in the opposite recess in A, being



SPARK PLUG ATTACHMENT.

kept therein by the swinging bolt on the flange A engaging with a slot cut in B, the flanges A and B being kept in contact by this bolt and nut. The whole device is perfectly simple, and should fill a real want. The plug when used with this fitting is placed beyond the influences of any lubricating oil finding its way into the combustion chamber and depositing itself on the sparking points, to the utter ruin of the spark.—*Autocar.*

The French railroads allowed a reduction of 50 per cent. in railway fares for delegates to the alcohol congress held in Paris during the automobile show.

The A. C. G. B. and I. now claims to have more members than any other automobile club in the world, the membership

having at the last election of candidates, held December 5, attained 2,180 members.

The Portuguese Minister of War has placed an order for five military motor trucks with the Fabbrica Italiana di Automobili, of Turin.

The sports committee of the A. C. F. has appointed a sub-committee to organize a competition of chrometric apparatus.

The Belgian Automobile Manufacturers' Association has decided to change the date of its annual show from April to February, to secure the patronage of the Automobile Club.

The A. C. G. B. and I. reports that its new club house, 119 Piccadilly, is now fully furnished, that a first class chef has been engaged and a staff of servants is being selected.

Dr. Maurice Marcille, a rising young medical man of Paris, on December 7 eloped with Mlle. Cordelia le Play, daughter of the well known ex-Senator, in an automobile.

Roger Wallace, K. C., president of the British Automobile Club, has been elected a member of the honorary committee of the Brussels Salon, to be held in April next, under the patronage of the A. C. B.

The municipality of Paris will give a gold medal to the exhibitor at the Paris Salon who produces, in view of the exposition, the maximum of effort in the importance and choice of articles exhibited and their presentation before the public.

Upon the proposition of the Marquis de Dion consulates are to be established by the A. C. F. in various foreign countries for the purpose of supplying French automobile manufacturers with all the necessary information to enable the exportation of automobiles to be fully developed.

For the Gordon Bennett cup race the A. C. G. B. and I. has nominated two Napier vehicles and will arrange an eliminating race at Welbeck between the other two applicants for a place on the team, the Wolseley Tool and Motor Car Company and the Star Engineering Company.

The French Consul at Sarajevo believes that something could be done toward introducing motor cars into Bosnia by sending catalogues in German to the principal clubs at Sarajevo, viz., Herren Club, Touristen Club, and Radfahrer Club. Messrs. Bruener & Co. and Messrs. Racher & Babic are the leading firms in the machinery and small ware lines in the Bosnian capital. The Austn[illegible] us-toms make a fixed charge of 75 gulden (£7 10s.) on the carriage, and 7½ gulden (15s.) per 100 kilos. on the machinery parts.

The Life Saving Association of Budapest, Hungary, have recently made some tests with automobile ambulances. These vehicles are particularly useful when a rapid transport to a hospital is required, as in cases of poisoning, accidents. etc. The results have been so successful that a number have now been placed in regular service by the Association.

J. A. Koosen, of Portsmouth, England, who in 1895 brought a Benz car to England and was arrested under the "red flag" law, was arrested again a few weeks ago for driving at 15 miles an hour. He stated that in his seven years' experience he had driven automobiles 80,000 miles and had never had an accident. As he proved that he was not driving to the common public danger he was released.

Motor Van Trials Conference.

(HORSELESS AGE Correspondence.)

On December 4 a conference was held at the Automobile Club, London, with reference to the proposed trials of motor delivery vans. About sixty representatives of users and manufacturers were present.

The proceedings were opened by the Club Secretary reading a circular letter which had been sent to all those present, and which practically constituted the agenda of the meeting. There is no need here to give this document in extenso, but it may be well to say that after recapitulating what has been done in this direction in the past it went on to say that the club is of opinion that thoroughly efficient trials should be held and "I am therefore directed to approach you, together with many other large commercial houses in the United Kingdom, to enquire whether you can see your way to co-operate in this enterprise as follows:

"1. By considering what should be the requirements of such a vehicle.

"2. By sending a representative fully instructed with your views in the matter to attend a conference of the representatives of some of the big commercial houses to be held at the club next November.

3. By agreeing to contribute to the trials fund, so that really substantial prizes may be offered for the vehicles which may be considered to be the best in their classes at the trial; and also that funds may be provided for making the trials thoroughly practical and effective.

"It is suggested that no trial can be thoroughly satisfactory unless the vehicles are tried in actual service carrying loads daily over a period of not less than three months." The document continues with a suggestion that all vans should be under the observation of competent men, should be under lock and key when not in use, so
that cost of repairs and fuel, etc.,
be accurately ascertained. It then pr
"that some of the leading firms mi
willing to co-operate by agreeing th
trial vans should be run during th
in connection with their respective
nesses." The document closes w
statement that the interest taken i
proposal is considerable.

After the reading of this circular
a list of the firms from whom repli
been received with respect to the
letter was read. As the meeting ha
been called for 4 p. m., a considerabl
tion of the time available was tak
with this reading, and then the ch
suggested that users of vehicles
give the meeting the benefit of the
periences.

No manufacturer was permitted to
at this part of the proceedings, and a
tion addressed by Mr. Clarkson to th
resentative of the Post Office as to t
of van which the Post Office itself
be most likely to use was ruled
order. During the whole of this p
the proceedings nothing of any impo
or value was produced. Several me
got up and gave a more or less g
account of their experience, the sum
of the useful advice being that th
must be reliable and moderately ch
upkeep. It need hardly be said th
conference of the powers was necess
settle these points.

The first resolution passed was wit
erence to the classes of vehicle to b
and it was resolved that the trials
be restricted to vehicles for a net l
less than 2 tons (English). It wa
recommended that classes should be p
ed for vehicles carrying respectivel
than 2 tons, 1½ tons, 1 ton and ½ to
that special arrangements should be
for testing light vehicles in the last
as it was shown that there was a d
for cars for carrying 2 or 3 hundred
at comparatively high speeds for
paper work.

Mr. Edge then proposed that the
should be held for three months
January to March, 1904. On this
tion one gentleman pointed out tha
question of the duration of the tri
intimately associated with the class o
to be held and went on to say som
to the effect that by the proposal
secretary's letter to pass the vehicl
trial into the service of various fir
two vehicles would be tried alike.
chairman objected that he was not sp
to the point, and he then asked the
man whether, in the event of i
being agreed that the trial should las
months and it being later found
sible to adopt the form of trial
gested in the secretary's letter,
these circumstances he (the cha
would guarantee that the club wou
dertake the trials. To this the ch
replied that he would certainly no
such a guarantee; whereupon the

erstood to say that it appeared : waste of time to pass resolutions might very well be found im- o carry out. The point was not iscussed and after a hurried dis- f the original question it was car- con. It was also agreed that the ould be left to the committee and present who wished should send names to the secretary as willing on the trials committee.

ter then rose to propose a resolu- e effect that it would be impos- onduct fair trials as proposed in tary's letter, but the chairman permit a discussion on this point, found that it was the exclusive of the trials committee.

. further futile attempt on the ne same speaker to raise a dis- f the advisability of having as ctions as possible and the ne- the issuing of the rules at the ossible date the meeting closed. at naturally the representatives manufacturers who had accepted tion of the club to send some- posted with their views, and who t they were granted no opportu- ver to express those views, were ther well pleased.

ly piece of information elicited s of any use to a manufacturer as that a firm delivering a lot of towns does not use large vans, ou have your goods buried up npossible to get them out quickly.

ill Delivery by Automobile.

s Motor Works send us a copy they received from F. E. Shard- evideo, Minn., giving an account ne made in his Oldsmobile with nail carrier of Route No. 3. The d a distance of 26 miles. The d out at 8:03 a. m. The mail d in five packages, to facilitate g en route. The vehicle was ectly in front of the mail boxes oad and the mail put into them ehicle. The mail was thus dis- seventy-five boxes. The roads ed as having been rather poor. as completed at 10:29 a. m., so urs and twenty-six minutes were he road, about two hours and ites less than is occupied when y is covered with a team.

onal Motor Vehicle Company, of s, Ind., makers of the "Na- ctric automobiles, will change to the National Motor Vehicle n January 1 in order that their be more easily distinguished r companies having similar e company propose to put on a line of gasoline vehicles un- ablished name, "National."

MINOR MENTION

Odette Tyler, an actress, has invented a mask for use by automobilists.

The Overman Automobile Company will remove from Chicopee Falls, Mass., to Bridgeport, Conn.

The annual meeting of the American Motor League will be held at New York on January 22, 1903.

Brockton is said to have the largest automobile club in Massachusetts except Boston. Its membership is forty-one.

J. Edward Newton, Fall River, Mass., will establish an automobile station and storage house at Bedford and Troy streets.

What is said to be the largest auto truck ever built has been tested by the Morgan Truck Company, Worcester, Mass. Its capacity is placed at 10 tons.

The Niagara Frontier Automobile Company, Niagara Falls, N. Y., has been incorporated to build and equip a station for storing, cleaning and repairing; capital, $25,000.

The Pratt & Whitney Company, of Hartford, Conn., have issued for general distribution a comprehensive, well executed treatise on the subject of thread milling.

On January 1 Charles D. Shain will remove to his new store at 70 Murray street, New York, where a full line of automobiles, parts, motors, accessories and supplies will be carried.

The Federal Manufacturing Company, Cleveland, Ohio, makers of the "Cadillac," report that they have decided to equip all their vehicles with 1 inch pitch, one-half inch wide Diamond driving chains.

Prof. C. H. Peabody, of the Massachusetts Institute of Technology, delivered a lecture on "Gas Engines" at the smoker of the Massachusetts Automobile Club, Boston, on December 18.

The Miller-Mundy Motor Carriage Cleveland, Ohio, report that the makers of the "Cadillac" have decided to equip all their vehicles with 1 inch pitch, one-half inch wide Diamond driving chains.

A test of a new motor truck invented by William O. Worth, and equipped with a motor, said to be of peculiar construction, was made at Chicago last week by the Chicago Motor Vehicle Company, and it is said to have proved satisfactory.

At the annual meeting of the Long Island Automobile Club, Brooklyn, N. Y., on December 17, officers were elected as published by us last week. A dinner followed and addresses were made by L. R. Adams, F. G. Webb and W. W. Grant.

Osen & Hunt and the Letcher Manufacturing Company, San Jose, Cal., are having automobile factories erected, that of the former to be 85x65 feet, one story high, and that of the latter 100x60, two stories high.

In a recent communication the Fisk Rubber Company, Chicopee Falls, Mass., state that their detachable tire is not made under the G & J patents but under their own patent, which they claim is not an infringement of the G & J patents.

It is stated that experiments are being made by a New York company under the direction of Richard Currier at the factory of the Automobile Company of America, which it is thought may result in perfecting an automobile with higher speed and longer running powers.

Tests of delivering the rural mail in Lenawee County, Mich., are said to have resulted satisfactorily. A report of one test showed that a 29 mile route was covered in three hours fifty-six minutes, 125 stops being made, 2½ gallons of gasoline being consumed and the roads being very muddy and partially frozen.

Edward A. Winchester, superintendent of the Armstrong Transfer Company, Boston, Mass., is quoted as saying that he is not satisfied with the two automobiles he has been using on the ground of economy, but that he believes electricity to be the right kind of power for such automobiles, in preference to gasoline or steam.

The Peerless Motor Car Company, Cleveland, Ohio, have just completed two additions to their factory covering over 12,000 feet, and are planning for larger additions. The company state that the volume of business has so increased the past year that it will be necessary for them to find larger quarters in the near future or take on an additional factory.

On December 25 the following board of officers of the Knox Automobile Company, Springfield, Mass., was elected: President, Albert E. Smith; vice president, Harry A. Knox; clerk, H. G. Farr; treasurer, E. H. Cutler; assistant treasurer, Albert E. Smith; directors, E. H. Cutler, H. W. Cutler, of North Wilbraham; John McFethries, Charles E. Van Norman, H. A. Knox, H. G. Farr, A. E. Smith, William Wright.

The National Motor Vehicle Company, Indianapolis, Ind., have issued a new schedule of prices. They say that a number of improvements have been embodied in their 1903 models, the entire line of which will consist of ten. George M. Dickson, of this company, has returned from a trip to Cuba. He says that very few automobiles are in use there, and he thinks this is due to local conditions, customs duties and lack of charging facilities, although future trade should be considerable. The entire city, he says, possesses only twelve or thirteen automobiles, several of which are of the steam variety, and

only two or three of which are up to date. Arrangements for a representative of the company in Cuba have been made.

The Olds Motor Works loaned the Detroit Post Office three of their fastest road machines during Christmas week rush.

The Lynn Automobile Company have removed from Malden, Mass., to Lynn, and are proposing to build gasoline and other motor carriages, except electrical.

The Knox Automobile Company, Springfield, Mass., have leased more room in the Potter Building, and, it is stated, will increase their output to eighteen machines a week.

The Thermobile Company of America has been incorporated to build and deal in automobiles, motors, etc.; capital stock, $1,000,000; incorporators, William H. Lake, Z. Wirt and D. M. Bell, all of Chicago.

It has been stated that Alexander Winton has declined to race against Barney Oldfield on the ground that he is too busy working on his racer for the international cup contest.

What is said to be the first American automobile speedway has just been completed at Lakewood, N. J., by the Lakewood Hotel and Land Association. It is about 1¼ miles in length.

The Clemick-Hirsch Company, Milwaukee, Wis., manufacturers of gasoline motors, will, it is stated, enter the list of manufacturers of automobiles, and expect to turn out their first machine next February.

The Westchester Automobile Company, New York, has been incorporated with a capital of $15,000. The directors are Sanford Robinson and L. E. Holden, New York, and Thomas Holden, Jr., White Plains.

The Turbine Electric Truck Company, Yonkers, N. Y., has been incorporated; capital, $10,000; directors, J. D. Sullivan, H. D. Crippen, J. J. Crippen, William C. Dodge, New York, and F. A. Curtiss, Nutley, N. J.

Forestalling the proposed Chicago automobile numbering ordinance, Enos L. Moore recently appeared on the city streets in his automobile with 8 inch figures on the back and his initials on the end of the seat.

At the shops of the Close Cycle Company, Olean, N. Y., automobiles of the runabout pattern, modeled after the French machines, are being made, and the company are reported to have contracted for several of them in advance.

The Automobile Equipment Company, 330 North Illinois street, Indianapolis, Ind., are manufacturers of and jobbers in their own patented rain aprons, chain and engine boots, detachable leather touring cases, etc.

E. J. Pennington, last located in Detroit, Mich., has again disappeared, and Mrs. Pennington is looking for him with the aid of the police of Windsor, where, after purchasing tickets for Toronto, she left him in the [illegible] e returned to Detroit to draw what was left of their bank account. Mrs. Pennington says her husband has spent a fortune in attempting to perfect an automobile, etc., and that they are now in sore straits.

During the Christmas rush H. B. Shattuck & Sons, New England representatives of the Oldsmobile, tendered the use of one of their machines and an expert to the postmaster of Boston for one of the city routes in the Back Bay district while the ground was covered with snow.

Accidents.

Two front wheels of a Chicago department store's autobus fell off last week, but the passengers escaped with slight injuries.

A street car ran into the small motor carriage of Willis S. Kilmer, Binghamton, N. Y., on December 19 and broke the back of the machine.

While Edward Bennett was riding in Jersey City, N. J., on December 25, the axle of his automobile broke, but Mr. Bennett escaped injury.

Thomas Maloney, Aurora, Ill., was recently struck by an automobile owned by Dr. C. L. Smith, who then took the injured man to a hospital and attended him.

Isaac Lawrence, a messenger boy, was run over in Philadelphia, Pa., by an automobile operated by S. C. Robinson. The accident is pronounced to have been unavoidable.

The four year old son of Richard Denver, Buffalo, N. Y., was killed on December 24 by being run over by the automobile delivery wagon of the Hard Manufacturing Company.

P. T. Lubers and Richard Fenn, en route from Philadelphia, Pa., to Boulder, Col., lost control of their automobile while descending a steep hill and barely escaped death.

J. Clinch Smith, an automobilist, and D. L. Murray, a bicyclist, collided at Hempstead, N. Y., and Mr. Murray was injured. Mr. Smith offered to pay all expenses connected with the accident.

Michael Evans, while crossing Third avenue at Thirty-third street, New York, on December 20, was knocked down by an unknown automobile. He was taken to a hospital in an unconscious condition.

Peter J. Stevens, St. Louis, Mo., sustained scalp and other bruises by being knocked down by an automobile on December 12, and a charge of careless driving was preferred against Chauffeur J. D. Fenton.

Mrs. Margaret A. Whalen and her son had their runabout struck by a swiftly moving steam automobile at 149th street and Seventh avenue, New York, on December 22 and were thrown out. The chauffeur, Charles Durier, attempted to escape but was arrested, and as he promised to make reparation, Mrs. Whalen refused to make a complaint.

LEGISLATIVE AND LEGAL.

Before the town council of Joli[illegible] an ordinance to limit the speed of a[illegible] biles is pending.

François Guichane, chauffeur of [illegible] M. Huntington, New York, was fin[illegible] on December 22 for speeding Mr. [illegible]tington's automobile too fast.

David Simpson, whose buggy w[illegible] molished recently in Chicago while [illegible]liceman was pursuing a racing autor[illegible] has presented a claim for damages.

Jos. L. Padelford, a New York [illegible] was arrested on December 22, charg[illegible] running an automobile, which he s[illegible] made himself, at 15 miles an hour.

The Philadelphia City Counci[illegible] passed an automobile ordinance li[illegible] the speed within the built up parts [illegible] city to 7 miles and in other parts to [illegible] per hour.

Mrs. Emma Blake, Derby, Con[illegible] December 26 paid $100 fine impose[illegible] her chauffeur, George Farrier, for exceeding the speed limit for autor[illegible] in New York.

Automobiles have been exclude[illegible] the grounds of Hotel Raymond, L[illegible]geles, Cal., on account of numerou[illegible] dents which have occurred because [illegible] steepness of the hill.

In the Court of Special Session[illegible] York, George F. Baker pleaded not [illegible] to a charge of having run his auto [illegible] last week beyond the legal limit, b[illegible] fined $25, which he paid.

An ordinance has been passed [illegible] board of trustees of Alameda, Cal. [illegible]ing the speed of automobiles, etc. maximum of 12 and in some cases [illegible] an hour, under a penalty of $25, [illegible]prisonment not exceeding two d[illegible] both.

Paul Verget, chauffeur of Cord [illegible] was arrested in court at Mineola, immediately after Mr. Meyer had [illegible] fine of $30 for a recent violation [illegible] speed law, but was released on ba[illegible] January 3, when his case has b[illegible] down for trial.

To test the right of the park b[illegible] Baltimore to prohibit automobile[illegible] the park, William Keyser, presiden[illegible] Automobile Club, took his machi[illegible] on one of the avenues last week a[illegible] immediately arrested. A justice [illegible] that the arrest was unwarranted, a[illegible] ordinance forbids the commissione[illegible]ing a rule excluding automobiles.

The Syracuse (N. Y.) Automobi[illegible] will make a vigorous attempt to i[illegible] the State Fair Commission to set [illegible] day for automobile racing at the an[illegible]hibition, and also to compel the to[illegible] near that city to expend more [illegible] earnings upon improvements. T[illegible]

pted a new constitution and the an- ection and banquet will take place iary 5.

matter of licensing automobiles in ork is still in abeyance, pending the ; of the aldermanic committee on 5, when the subject will be taken

e case of the appeal of Harry S. orth, Rochester, N. Y., from a e of $50 for speeding his automo- ceeding 20 miles an hour, which paid under protest, the Appellate n of the Supreme Court has l the sentence.

S. Dauler, Pittsburg, Pa., has sued Louis Motor Carriage Company 000 damages on account of the defectiveness of an automobile, ie purchased and for which he paid wn and agreed to pay the balance ptance of the machine.

spatch of recent date says that Harrison, of Chicago, has vetoed nance providing for the numbering mobiles, but declared that he is pathy with its purposes. In case or had signed it, the Chicago Au- e Club contemplated carrying the to the Supreme Court.

result of a conference with Albert tuck, president of the Automobile f America, and Mr. Niles, it is e that the committee of fifty will iend to the Board of Aldermen York that the limit of speed of ve- while restricted to 8 miles an hour more densely traveled streets, be d to 15 miles an hour in the outly- ricts where the roads are open and n can result from a higher rate of This refers to all vehicles, irre- of the propelling power, except ars. The matter will be definitely at a meeting to be held January 5.

ecent French Goods Vehicle Trials.

trials of heavy industrial vehicles om time to time, while affording iteresting data as to working cost, ot thrown much light upon the important questions of the relia- nd regularity of these cars. The of holding trials on out and home so that the vehicles shall return y to the starting point to be over- and cleaned, may very closely ap- ite to the conditions under which rk in actual service, especially for n goods delivery, but such tests iewhat misleading from the point of reliability and durability, since ities for carrying out repairs rather e the importance of accidents y be met with on the road. It is reason that the holding of a trial les from Paris to Monte Carlo, a of about 700 miles, which had to ed in eleven days, promised to be larly interesting and novel experiment. It was the first time that so many industrial cars had been required to undertake such a long journey by consecutive daily stages, and as the route was entirely unknown to most of the drivers, the conditions were not so favorable for economy and regularity as is the case with trials held over courses where every gradient is familiar.

Organized by the journal *La France Automobile*, the trials attracted thirteen vehicles as follows: MM. Turgan Foy et Cie., Rue Carnot prolongée, Levallois-Perret (Seine), a steam lorry and a steam tractor carrying a load and hauling four artillery wagons; M. Chaboche, 33 Rue Rodier, Paris, a steam delivery van; De Dietrich et Cie., of Lunéville, four petrol omnibuses and a lorry; the Daimler Motoren Fabrik of Cannstadt, a lorry; the Societé des Automobiles Peugeot, Boulevard Gouvion St. Cyr, Paris, a berline or coach, a delivery van and a lorry; the Société des Automobiles Gillet Forest, Rue Carnot, St. Cloud, a delivery van; Panhard et Levassor, Avenue d'Ivry, Paris, an omnibus. The trials were carried out under very careful supervision, each vehicle being accompanied by an observer, and the petrol tanks were sealed on starting and filled up at the end of the journey, to ascertain the exact consumption. This was done by the organizer of the trials, M. Paul Meyan, and by two artillery officers, Commandant Mangin and Commandant Ferrus, who had been delegated by the Minister of War to follow the trials. The military authorities are, indeed, taking the keenest interest in motor vehicles for road transport. Besides economy, another question to be considered was regularity of running, and all the vehicles were timed at distances of about 15 miles. The start took place from the Fort of Vincennes, near Paris, on the morning of March 26; the cars, after being weighed, proceeded to Sens, and then on subsequent days to Avallon, Dijon, Macon, Lyons, Valence, Avignon, Marseilles, Toulon, Fréjus, Nice and Monte Carlo.

From the point of view of heavy transport, it appeared as if interest would centre chiefly in the steam cars. The Chaboche van and Turgan lorry are interesting because French automobile engineers do not follow the lines that have been adopted by English makers of steam wagons, who are largely influenced by traction engine design and construction, but they aim principally at lightness in their generators and propelling machinery. Consequently the flash or semi-flash type of boiler is greatly used, together with high speed engines and reducing gear. The Turgan system, however, is an exception, since the efficiency of the boiler depends simply upon a large heating surface and a rapid circulation of water. The compound engines bolted to each side of the frame are connected direct with the driving wheels without intermediate gear of any sort. In the Chaboche and Turgan vehicles there were thus two entirely distinct systems, the one essentially French in character, with its flash generator, two cylinder double acting engine with reducing gear and shaft transmission, and the other, with its water tube boiler and positive drive from the short crank shafts to the rear wheels, presenting some of the simplicity and directness of British engineering practice. The boilers of all three vehicles were fired with coal.

The total weight of the Chaboche van was 5 tons, but as it did not finish the journey the vehicle was not weighed empty; we were informed, however, that the tare was 3½ tons, leaving 1½ ton for load. This load was made up during the trials of bags of sand, as well as tools and exchange parts, and a barrel to hold a reserve of water. The run on the first day was uneventful, the van leaving Vincennes at about eight o'clock, and arriving at Sens at half-past seven in the evening. The distance was rather more than 60 miles. On the second day the van ran very poorly, owing to the difficulty of keeping up steam pressure. As we have before explained, the boiler has two coils of tubes which are kept red hot, and water is injected under air pressure, equal to the working pressure in the generator, so that the steam pressure ought to remain practically constant except when additional water is injected to overcome any special resistance. We were convinced during the trials that this is what takes places so long as the tubes are red hot. After the fire had been freshly made up the vehicle traveled very well indeed, frequently running at the rate of nine miles an hour over hilly roads, while a very severe gradient of about a kilometre in length at Précy-sous-Thil was taken in seven minutes.

These bursts of speed, however, were of very short duration. The coal was repeatedly burning on the bars in clinkers, and as the fire went dead the tubes were not so hot as they should have been, with the result that the boiler was flooded. The compressed air injector sent more water into the generator than the tubes could vaporize. The van ran under these conditions for two days and two nights. It was stranded 3 miles before reaching Avallon at 2 o'clock in the morning, through the coal supply giving out, and it was six hours later when the vehicle entered the town. Between Avallon and Dijon the route is extremely difficult, the road rising to an altitude of 1751 feet at Sombernon, and these up grades were taken at a very slow rate. The Sombernon was passed at 3 o'clock in the morning, and when about 8 miles from Dijon M. Chaboche found that he could not arrive in time to avoid disqualification, he withdrew from the trials.

So far as can be judged from the performance of this type of vehicle, it certainly seems as if the steam van is not suitable for long journeys unless special arrangements are made for coaling and watering. The Chaboche van was designed solely for suburban traffic, and it is probable that it

would prove satisfactory for such work, since the vehicle can carry a sufficient supply of suitable coal for its short journeys. But on long runs in new country, where coal and water must be taken where it is found, there is bound to be a great deal of trouble. Owing to the small grate area only the best steam coal can be used, but if the quality of the fuel be at all inferior it is impossible to prevent the bars from being choked up with clinkers and to keep the tubes red hot. The constant cleaning of the grate was so wasteful of fuel that between Sens and Avallon the van consumed 7.6 hundredweight of coal.

It was impossible to get the exact consumption of water, as this was taken in buckets which were not always full. There is not only a difficulty in finding a suitable coal, but also in obtaining supplies of water, and on descending the Sombernon some hours were lost in looking about for water with the light of a lantern. With the aid of a couple of buckets full obtained from a distant stream the van was able to proceed to a neighboring village. Had the van continued the trials it would have met with a great deal of difficulty on this score, for south of Avignon there was scarcely a drop of water to be found outside the towns.

The experience with the Chaboche, as well as with other systems, seems to show that the flash type of generator cannot be successfully fired with coal when the grate area is necessarily so small, and all the attempts to use flash boilers in heavy vehicles have failed to give good results. On the other hand, the system has proved itself very successful on pleasure carriages where the generator is fired with paraffin, and M. Chaboche is also building light vehicles with oil burners. His system is so interesting and ingenious, with its automatic feed and lubricating devices, that it is satisfactory to find that the failure of the heavy car does not condemn the system, but merely suggests whether its application to heavy vehicles is not defective. The Chaboche pleasure carriage with oil burners is not only practically automatic, but is said to have remarkable elasticity and doubtless much more will be heard of it before long.

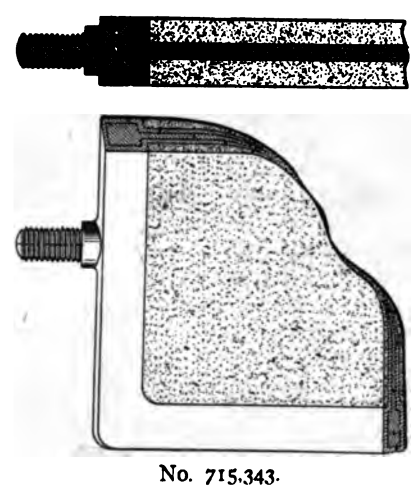
The Turgan lorry was unfortunately put out of the running at the start. It was a victim of the bad weather, which made the conditions very hard during the first six days of the trial, and when traveling on the wet and greasy granite sets between Paris and Villeeneuve-St. George's the lorry skidded and ran into the curbstone, when the front axle was bent. The vehicle had to be withdrawn. The tractor, which had the same type of propelling machinery, carried a load of 4 tons and hauled four artillery wagons weighing 3½ tons, the total weight of the "train" being 12½ tons. The vehicle naturally did not travel very fast, and on the first day it took twenty hours to go from Paris to Sens, though several hours were lost on the way. —*The Engineer.*

MOTOR VEHICLE PATENTS..

715,343. Accumulator.—F. N. Blanc, of Paris, France. December 9, 1902. Filed February 17, 1902.

Both the core and frame of the electrodes are made of aluminum and are entirely covered with metallic lead. A coating of paste is applied on both faces of the plate thus made. The covering of metallic lead is deposited by plunging the plate into a bath of molten lead, the plate of aluminum having been previously covered electrolytically with copper, so as to facilitate the adherence of the lead onto the aluminum.

One method of electroplating aluminum with copper is as follows: After scraping the aluminum article to be plated with sand or caustic potash it is placed in a weak solution of hydrochloric acid. It is then slightly washed before being dropped into the first bath of copper. This first bath is composed of neutral sulphate of copper dissolved up to saturation in distilled water. The article is left in the first bath for half an hour, the current, however, being much stronger than that ordinarily used for electroplating, 10 amperes per square decimetre of surface of the article being suitable. When the article has been well coated with copper, it is put into a second bath composed of sulphate of copper dissolved up to saturation in acidulous water, the bath being of 22° to 25° Baumé. In the second bath the current is normal—that is to say, from 1 to 2 amperes per square decimetre of surface of the article. In both baths the anodes are in red copper and must have about the same area as the article to be electroplated. In the first bath the coating of copper deposited upon the article is comparatively thin, but in the second bath a coating of any thickness may be secured.



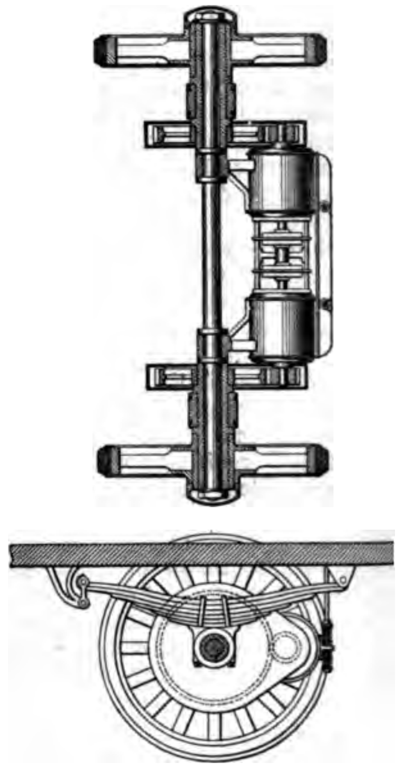
No. 715,343.

The object of the covering of metallic lead is for the purpose of insulating the aluminum from the electrolyte, and thus avoiding the formation of sulphate of a[luminum], which, being a bad conduc[tor], would hinder the passage of the curr[ent], or, what comes to the same thing, incre[ase] the resistance of the plate.

715,411. Running Gear for Automob[iles] —Chas. E. Neal, of New York, N. Y. [De]cember 9, 1902. Filed December 24, 1[902].

715,513. Fluid Pressure Engine.—[Her]mann Romanski, of Zwickau, Germ[any]. December 9, 1902. Filed April 24, 190[2].

715,596. Driving Mechanism for V[ehi]cles.—Lars G. Nilson, of New Y[ork], N. Y. December 9. 1901. Filed May 1902.



No. 715,596.

The hubs of the driving wheels are [in] the form of sleeves and extend to a c[on]siderable distance inward on the axle, [and] the hubs have bearings in the clips [or] saddles to which the body support springs are attached. Attached to [the] hubs at the inner sides of the springs [are] gear wheels which engage with pinions [on] the motor shafts. It will be noted [that] two electric motors are provided for [the] driving mechanism—that is, one motor [for] each driving wheel—and these motors [are] supported by brackets mounted to sw[ing] slightly on the axle. Arranged betw[een] the motors is a frame, in which bear[ings] for the shafts are arranged. Attache[d to] the field casings of the motors is a [bar] having bearings through which pass r[ods], the upper ends of which are connecte[d to] the vehicle body, and upon these rods [are] arranged two springs, between which [the] bearings on the motors are supporte[d].

715,670. Automobile Crane.—Mose[s] Kouns, of Washington Court H[ouse], Ohio.

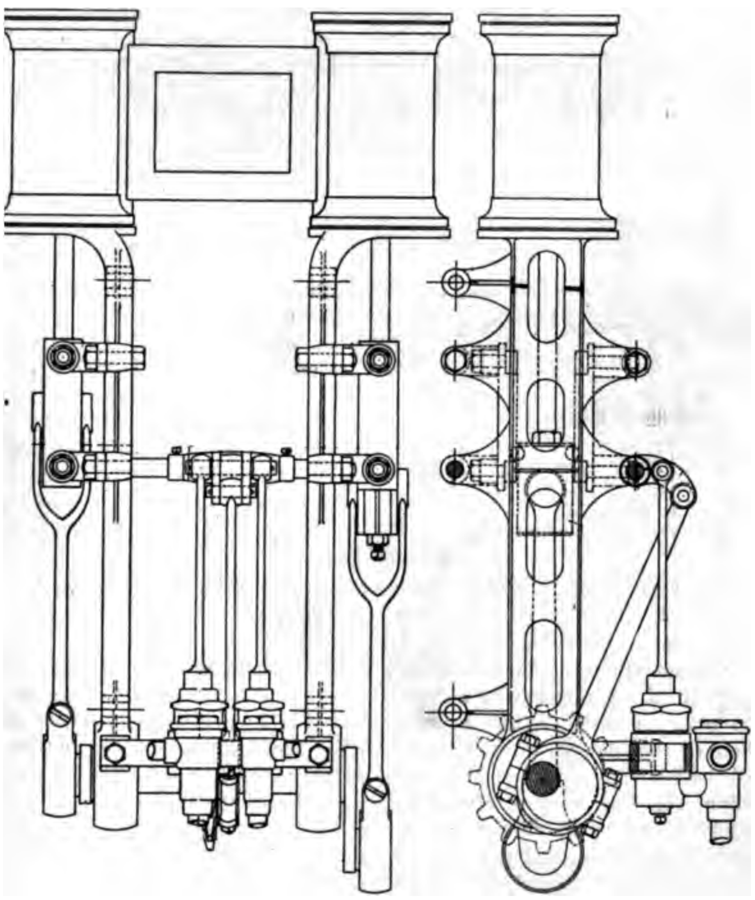
715,784. Puncture Heating Comp[ound] —L. C. Grant, of Cleveland, Ohio, a[nd]

er, of Caldwell, N. J. December Filed August 15, 1902.

s of an admixture, by weight, of ring ingredients: Granulated cork, ; ground asbestos, 9 ounces; mica, 4 ounces, and powdered ounce. The asbestos is ground ately to the fineness of screen . 100 and the mica to the fineness mesh No. 60. Slight variations proportions do not affect the of the invention. By careful nt these degrees of fineness have nd to produce the best results. round coarser than indicated fficulty has been experienced in the mixture through the valve hen ground finer, the flakes have y to ooze out through the tire in ie smallest punctures. They have this by the addition of asbestos. eing of a fibrous nature, when to the puncture forms a sort of ich is held firmly by the elastic the rubber tire. The greater the the more firm and rigid is the he rubber upon the asbestos, so mount of pressure or rough han- ı dislodge it. The mica fills a place, working its way into the and smaller crevices.

Frame for Steam Engines.— Reynolds, of Mansfield Depot, December 16, 1902. Filed June

me to which the working parts of the engine are attached depend from the cylinders, and the engine is supported by means of lugs extending from the frame. The frame is held from springing by cross ties, and on one of these ties is mounted a rocking arm, connected at its other extremity with the upper end of an eccentric rod. Mounted on this rocking arm, between the tie and the rod, are pump rods for pumps, supported in a seat on projecting arms of the engine frame.



No. 715,867.

715,821. Driving Mechanism for Motor Vehicles.—Joseph Ledwinka, Chicago, Ill. December 16, 1902. Filed February 10, 1902.

715,954. Vibration Equalizing Support for Motors.—Adrien Bocket, of Paris, France. December 16, 1902. Filed March 23, 1901.

716,031. Pneumatic Tire.—Henry N. B. Good, London, England. December 16, 1902. Filed March 17, 1902.

716,065. Automobile.—Joseph Ledwinka, Chicago, Ill. December 16, 1902. Filed January 31, 1902.

716,066. Resilient Tire.—Jean P. Le Grand and Narcisse Cheneau, Levallois-Perret, France. December 16, 1902. Filed January 15, 1902.

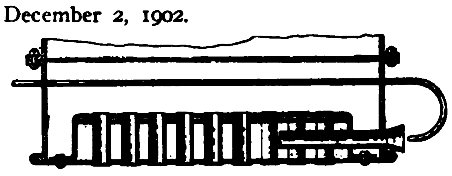
716,069. Explosion Motor.—Julien P. E. Liet, Paris, France. December 16, 1902. Filed September 23, 1902.

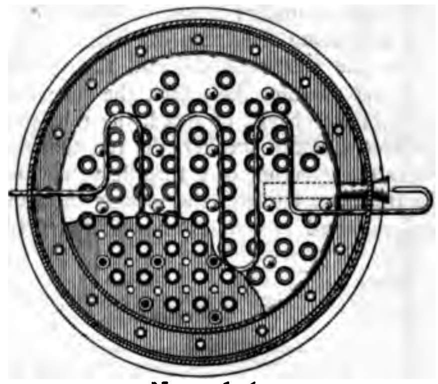
716,099. Tire for Motor Vehicles.—Max Polack, Waltershausen, Germany. December 16, 1902. Filed June 9, 1902.

716,115. Telescopic Compound Engine. —William Schneider, Chicago, Ill. December 16, 1902. Filed October 21, 1901.

716,263. Speed Indicator. — Laurence Mott, New York, N. Y. December 16, 1902. Filed February 11, 1902.

716,167. Vapor Burner.—A. A. Ball, Jr., of Lynn, Mass. December 16, 1902. Filed December 2, 1902.





No. 716,167.

The burner has double top plates, with a relatively small space between to prevent back firing. The air tubes are made of seamless tubing, and are secured to the bottom plate by slightly expanding the end. They are expanded at their upper ends to make a tight fit with the intermediate plate. By this construction it will be seen that the dishlike member consisting of the top plate and wall is not directly secured to the tubes, so that when it is desired to substitute a new top plate the bolts can be removed and a new one mounted at a small expense. The top plate is, of course, subjected to more or less intense heat, and is liable to crack; but with the construction shown, even if a material crack develops, the burner will continue to operate satisfactorily on account of the restricted chamber between the top plates, which prevents the fire working back into the distribution chamber.

716,388. Steering Mechanism for Motor Vehicles.—Charles Crompton, Worcester, Mass. December 23, 1902. Filed January 29, 1902.

716,604. Spring Frame for Motor Cycles.—Edward Y. White, San Antonio, Tex. December 23, 1902. Filed May 12, 1902.

716,610. Motor Vehicle.—William O. Worth, Chicago, Ill. December 23, 1902. Filed June 16, 1899.

716,693. Pneumatic Inner Tube for Tires.—Charles E. A. Esse, Ormskirk, England. December 23, 1902. Filed May 16, 1902.

716,168. Vehicle Brake.—A. A. Ball, Jr., of Lynn, Mass. December 16, 1902. Filed January 27, 1902.

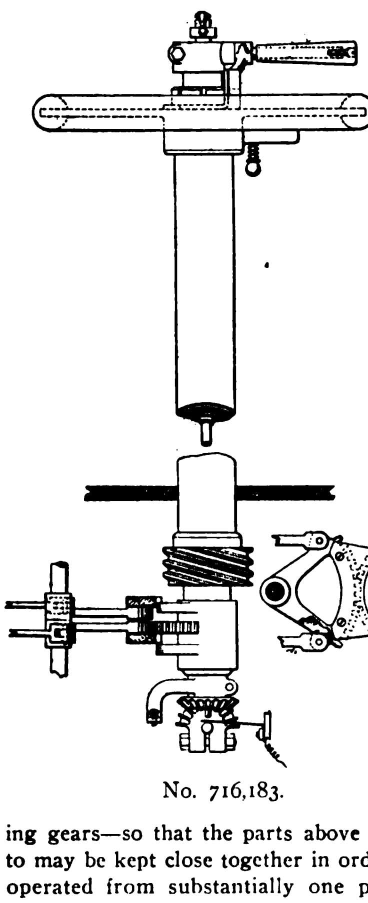
In order to provide for emergencies, a power actuated means is provided for the brake, which means includes a powerful

spring for setting the brake, a power piston for releasing the brake, and a cylinder containing a body of incompressible fluid for controlling the action of the spring, the movement of the piston within the cylinder being controlled by a bypass valve, which is under the control of the operator.

716,709. Steering Lever.—Chauncey B. Hershey, Anderson, Ind. December 23, 1902. Filed January 14, 1902.

716,183. Steering Column for Automobiles.—H. Bartol Brazier, of Philadelphia, Pa. December 16, 1902. Filed August 13, 1902.

The invention relates to improvements in steering columns for automobiles, and consists in placing the following named parts within the steering tube, viz., the rod or tube that operates the alarm, the tube that operates the change of speed, the tube that operates a circuit breaker, the rod that operates the governor or a throttle valve, and the tube that operates the locking mechanism employed in connection with the driving gears—so that the parts above referred to may be kept close together in order to be operated from substantially one point instead of being placed far apart, as is done at present.

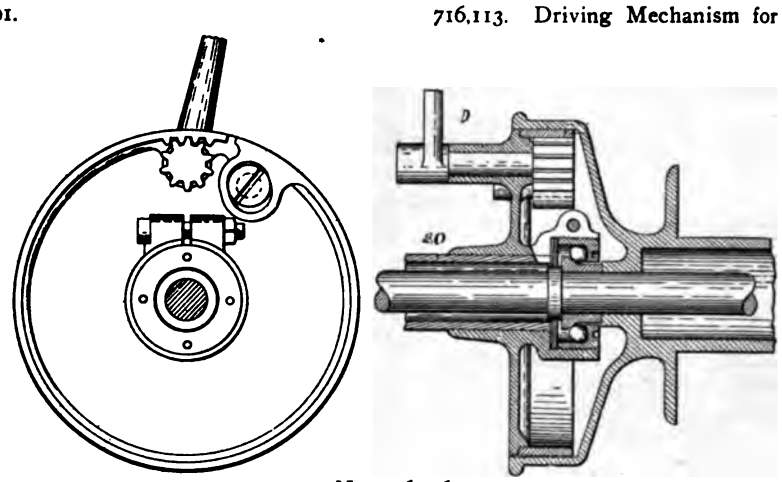


No. 716,183.

The outermost of the operating tubes controls the steering gear through a worm and worm wheel sector. The second tube acts as a standard, and the third controls the change gears. This tube is operated by a lever.

715,889. Means for Propelling Cycles and Other Light Vehicles.—S. Smith, of Milton of Campsie, Scotland. December 16, 1902. Filed September 5, 1902.

716,314. **Igniter for Hydrocarbon Engines.—William W. of Richmond Hill, and August Wassmann, of Astoria, N. Y. December 16, 1902. Filed December 18, 1901.**



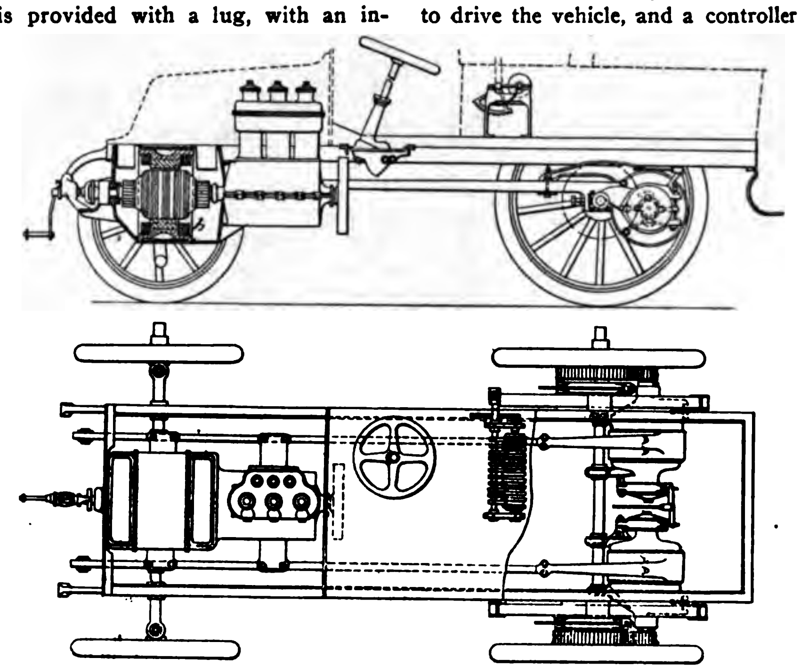
No. 716,076.

716,076. Brake.—Leo Melanowski, of Cleveland, Ohio. December 16, 1902. Filed June 6, 1902.

An enclosed hub brake. The device comprises a disk rigidly attached to the rear axle bearing tube, a drum attached to the wheel hub and a split ring on the inside of this drum. One end of the split ring is provided with a lug, with an in-clined slot through which a stud projecting from the disk passes. The other end of the split ring is provided with rack teeth on its inner surface, and with these engage the teeth of a pinion having a bearing in the plate or disk. When a lever on the shaft of this pinion, on the opposite side of the bearing, is turned in a certain direction, the split ring is caused to expand, and, owing to the inclined slot, the two ends of the band, and throughout its entire circumference expands uniformly and engages uniformly the entire inner brake surface of the drum. When the lever is moved in the opposite direction, the band will contract, owing to its spring construction, and be released from and out of engagement with the inner brake surface.

716,113. Driving Mechanism for Motor Cars.—Albert Schmid, of Havre, France. December 16, 1902. Filed January 28, 1902.

A combination gasoline-electric vehicle. **The novel feature seems to be the regulating system, the dynamo having a double wound armature, two commutators and two sets of brushes; a pair of electric motors is connected to the dynamo and arranged to drive the vehicle, and a controller is ar-**ranged to change the connections of the dynamo.



No. 716,113.

Clark Sintz, of Grand Rapids, Mich., one of the pioneer gasoline engine builders, who has been interested in the automobile movement since its beginning in this country, has just completed a gasoline automobile of the tonneau type, propelled by a double cylinder, 16 horse power engine located in front under a bonnet. The transmission gives three speeds ahead and one reverse and is operated by a single lever. A single friction clutch is used, which is operated by the same lever as the change gear. All the working parts are supported by an angle iron frame.

JUN 28 19

...THE...

Horseless Age

VOLUME 10 JULY 2, 1902. NUMBER 1.

IN THE INTEREST OF THE

EVERY WEDNESDAY

Automobile Industry

ESTABLISHED 1895.

Subscription:

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A car built especially for touring on American roads, and to meet the requirements of those who seek simplicity of construction, economy in running and unusual strength and durability. Built on the Hydro-Carbon System, 7 horse power, and will run 125 miles on one filling. Price, $1,000.

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Manufacturers of

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These cars are on exhibition at our salesrooms, 108, 110 and 112 West 41st Street, New York, where practical demonstration will be gladly given.

"TOLEDO" STEAM CARRIAGES

THE RELIABLE KIND.

A customer writes: - - -

GENTLEMEN—The "TOLEDO" Steam Carriage, Model B, received by me on February 15th has been driven 1,012 miles, over all kinds of roads, without the loss of a moment's time on account of machinery and without the cost of one dollar for repairs.

The carriage is the easiest riding and I believe the most durable steam carriage in use.

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THE COMMERCIAL WORLD IS COMPOSED
OF TWO SORTS OF MANUFACTURERS:

He who originates some new method or process and makes a success of it, and he who imitates some one else's process or method and quite often makes a success of that. The latter makes a success, not because the imitation is as good as the original, but because people confuse the two. Every man would rather have the particular qualities he desired in the original and not in any imitation.

No copy can be as good as the original idea, and there is no real competition between the initiator and the imitator. A procession is not a race.

THE KELLY-SPRINGFIELD TIRE

hewed out a certain path which had not before been followed in solid rubber tire making. Its success was so great that other solid tire makers followed as closely as they dared, but the fact remains that no matter how closely they follow, it is still following, it is not leading, and it is not even competing. It is a procession—not a race.

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All Roads alike to

THE OLDSMOBILE.

RUNS EVERYWHERE!

NOTHING TO WATCH BUT THE ROAD.

You can pay more money for an Automobile and get more smoke, smell, noise, trouble and profanity than we can offer you. If you are anxious to experiment, don't send for our Catalog.

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This Is the Selling Season

and you want an automobile. You want not a toy, but a good, big, comfortable carriage, having ample power to go anywhere at will—a vehicle suitable for city or country use. **DURYEA** vehicles are this kind. We have no new ones for delivery inside of two months, but have

A Demonstrating Carriage, four wheeler, newly overhauled and repainted, late sparkers and little improvements, ... **$1,000**

A Trap, seating four people dos-a-dos, either three or four wheels, late sparkers, thoroughly overhauled and repainted, ... **850**

These are bargains for someone. Further particulars on application.

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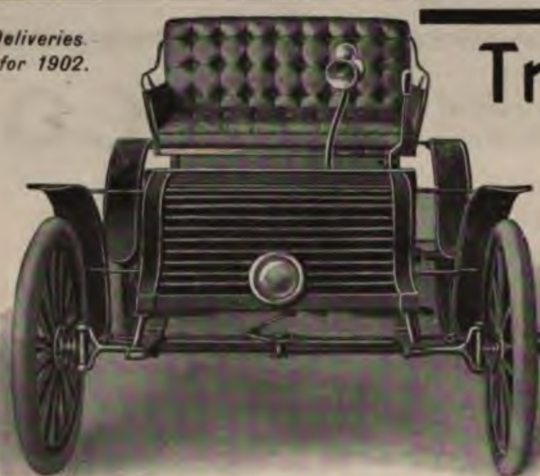
Early Deliveries. 1,500 for 1902.



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THE FRIEDMAN ROAD WAGON,

point for point, is the equal of any Gasoline Automobile sold in the United States for $1,200, and is the only machine equipped with a Double Cylinder Four-Cycle Balanced Engine that retails for less than that amount.

They will climb any grade up to 30 per cent. and develop any speed up to 30 miles per hour. Absolute and instantaneous control. Every engine guaranteed to develop 6 H. P.

Our price this year **$750.00.**

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Yours very truly,

H. W. ALDEN, M. E.

INTERNATIONAL A. & V. TIRE CO.

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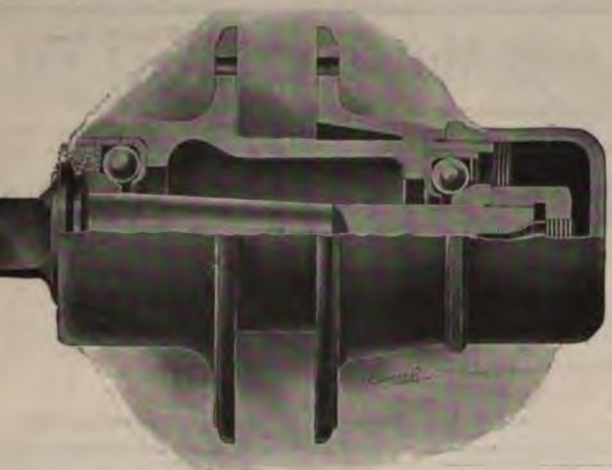

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Hubs and Spindles are machined Right and Left.

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SAMPLE FREE.

JOSEPH DIXON CRUCIBLE CO.

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IMPOSSIBLE!

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But you **don't** admit that it can be mended, and made as good as new, by brazing e broken parts together. If you will send to us a broken casting, of any kind or escription, we will braze it and make it as good as new. We only charge shop rates of ic. per hour, and will return your casting to you in a few hours, if it is a "rush" job.

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Send all communications to New York Office and all work to Factory.

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ONE DAY

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Patent Pending.

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Star Shape, Copper Tubes, with **Copper Tube Core. All the water** is in thin sheets in the oints of the star—air passes in centre of the tubes. ive tubes, 24 inches long, are sufficient for four orse power engine. **Price $12.50.**

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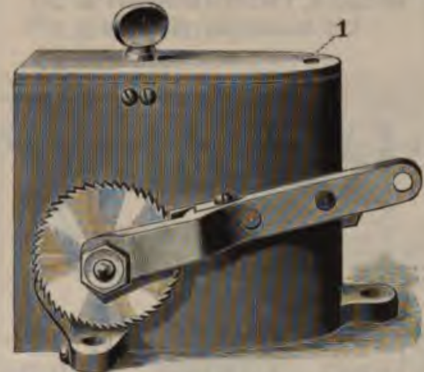
THE CARTER
Automatic Cylinder
LUBRICATOR



Requires no attention or regulating. Supplies a uniform amount of oil at all times. Easily attached.

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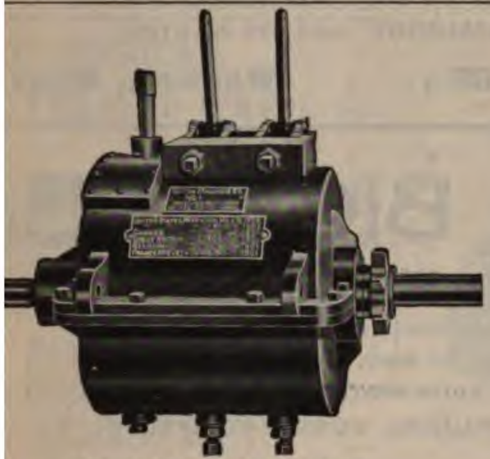

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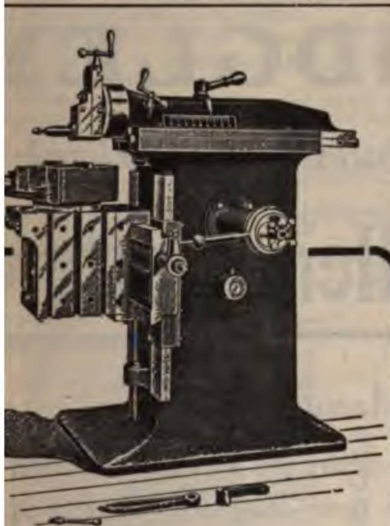

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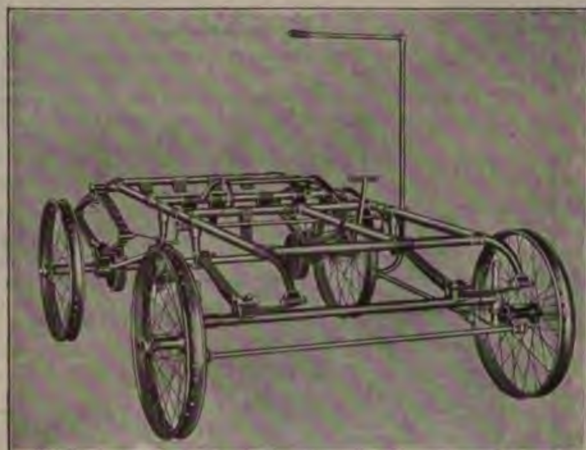

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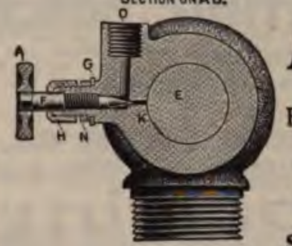

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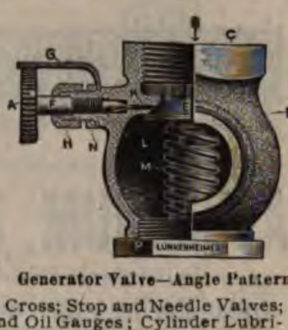

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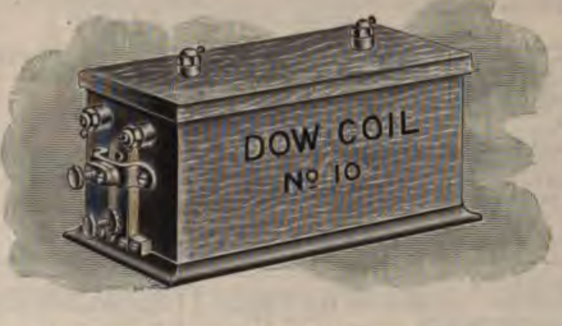

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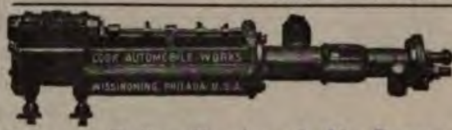

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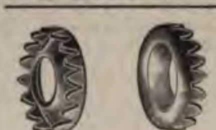

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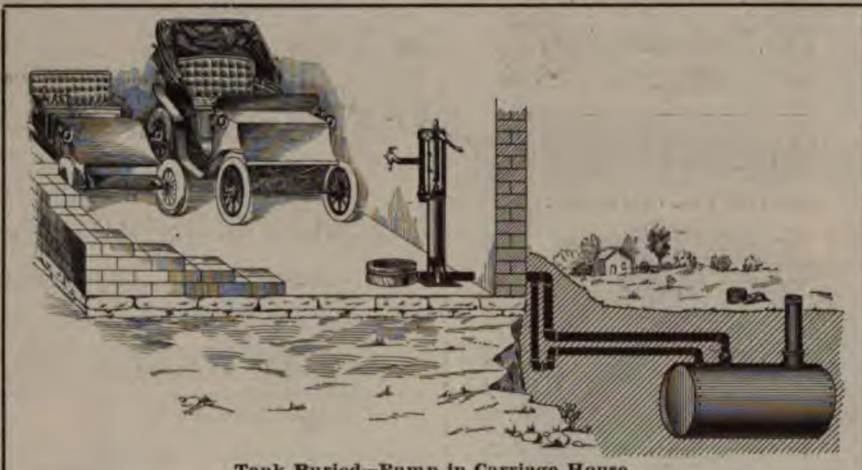

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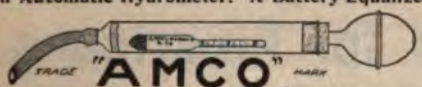

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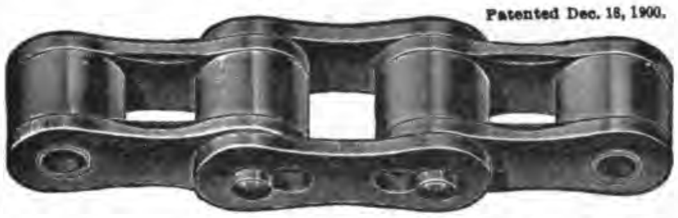

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VOLUME 10. DECEMBER 31, 1902. NUMBER 27.

IN THE INTEREST OF THE

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Automobile Industry

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Subscription:

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LOOK FOR DOCTORS' NUMBER, JANUARY 7.

1903 Model

THOMAS AUTOMOBILES

include every essential detail necessary for efficiency, comfort and reliability found on the most expensive foreign cars, and some that are not found on the best American cars. The prices and discounts are right.

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The Problems of

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IN MOTOR CYCLES

have all been solved in the

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The motors of these sets are wound for direct or alternating current and for all voltages used on lighting or power circuits.

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OUR

DOCTORS' NUMBER

of January 7

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FOR THE USER it will furnish many useful hints as to the operation and repair of automobiles and as to the merits of the respective types of machines now on the market.

FOR THE INTENDING PURCHASER it will prove a revelation, throwing a flood of light on the many perplexing problems surrounding the selection of an automobile, many of which he would not have thought of beforehand but for the experiences here so candidly told.

FOR THE MANUFACTURER it will be of absorbing interest to see what these fifty or sixty intelligent users in all parts of the country have to say of the different makes of machines they have handled in all kinds of weather and on all kinds of roads.

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FOR THE ADVERTISER it will afford an opportunity unequaled of reaching all classes of the trade, thousands of owners and

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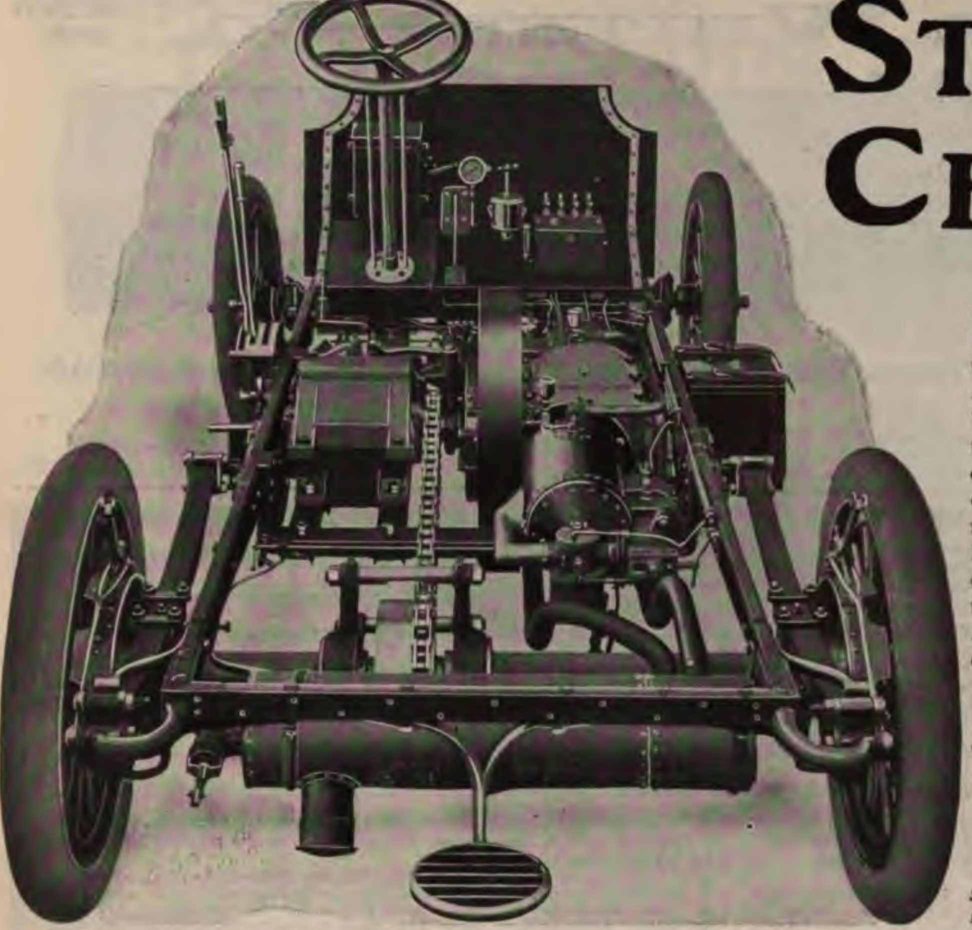

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NEW YORK to BOSTON and RETURN, came through with remarkable regularity of running—one with a clean score, the other with a single stop of a few seconds.

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Write us for the proof.
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MODEL OF 1903.

Orient Motor Car No. 9. 8 H. P. Price, $1,200.

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Never store their cars. They are always running. One customer wrote under date of December 19, 1902, as follows:

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Simplicity permits one hand control. With a complicated mechanism many levers and handles are necessary, but with a simple vehicle few levers are necessary, and these may be combined in a single handle, managed by either hand. No greater proof of the simplicity of **DURYEA** vehicles need be given than this. They are leaders in this respect. A sidewise motion steers, twisting the handle throttles, while the clutches are set by raising or lowering. No confusion—perfect and safe control. Send for catalog.

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DEVELOPED TO THE MAXIMUM.
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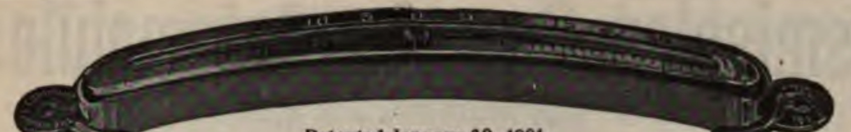

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Especially Adapted for Automobile Connections.

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$1,000 VALUE MACHINE **Dyke's No. 1 Outfit** WITH LEVERS ATTACHED TO TRANSMISSION

There is no better piece of **workmanship** or **design** on the market to-day. We have endeavored to put into our machine the **best** of everything. If you are looking for **cheap** material you will not get it in our outfit—although it will be much cheaper in the long run to get something first-class.

OUR OBJECT is to supply you with the Parts to build your machine. Although we supply you with a design of body, you can use your own taste in this selection. On the rear of the body a Tonneau can be attached and 4 passengers can be carried.

TANKS—The Water and Gasoline Tank is placed in front under a Brass Hood.

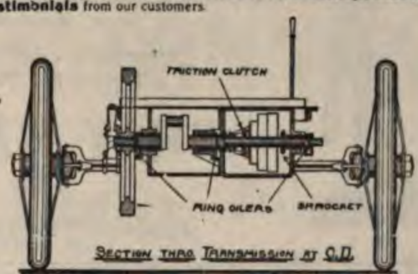
ENGINE is Dyke's Single Cylinder, 5¼x6, with a No. 2 Champion Transmission built direct on the engine shaft.

THE LEVERS are arranged on a casting which is cast to the crank head of the engine. This casting also acts as outer bearing for the engine shaft.

Our outfit consists of **Dyke's No. 1 Engine, Dyke's Flexible Reachless Ring Gear, Dyke's Carburetter, Dyke's Radiator, Dyke's Wheel Steering,** etc.

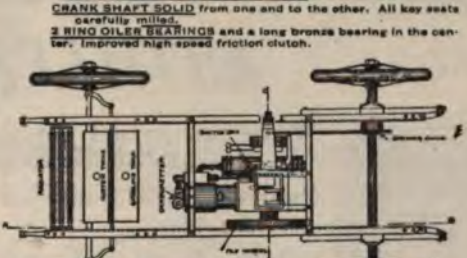
RUNNING GEAR is our **new** Model B, No. C, shown in our supplement, with **genuine** Artillery Hubs and Roller Bearings, extra heavy knuckles and finest workmanship possible. Everything guaranteed. **See testimonials** from our customers.

SIDE VIEW DYKE'S NO. 1 OUTFIT.



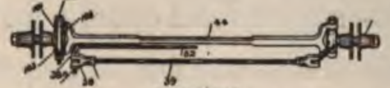
CRANK SHAFT SOLID from one and to the other. All key seats carefully milled.
2 RING OILER BEARINGS and a long bronze bearing in the center. Improved high speed friction clutch.

SIDE VIEW. (No. 1.)
Showing arrangement of Hanging Engine, etc.



OP VIEW.
Showing arrangements of Hanging Engines, Radiator, etc.
Attachment for holding Levers not shown.

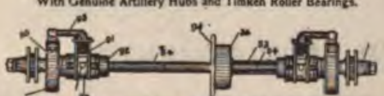
Side View No. 1 Engine and Transmission.



FRONT AXLE,
With Genuine Artillery Hubs and Timken Roller Bearings.

MACHINE MADE UP FROM DYKE'S No. 1 OUTFIT.

...dy, with Detachable Rear Tonneau Seat and Brass Hood in Front.



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Send 4 cents postage for catalogue and supplement.

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THAT THE

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"ASK THE MAN WHO OWNS ONE"
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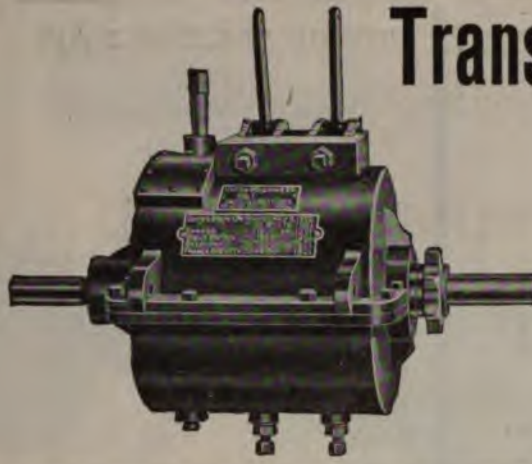

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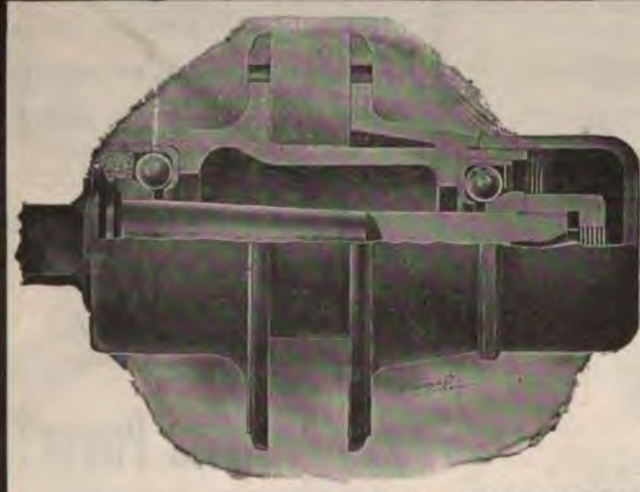

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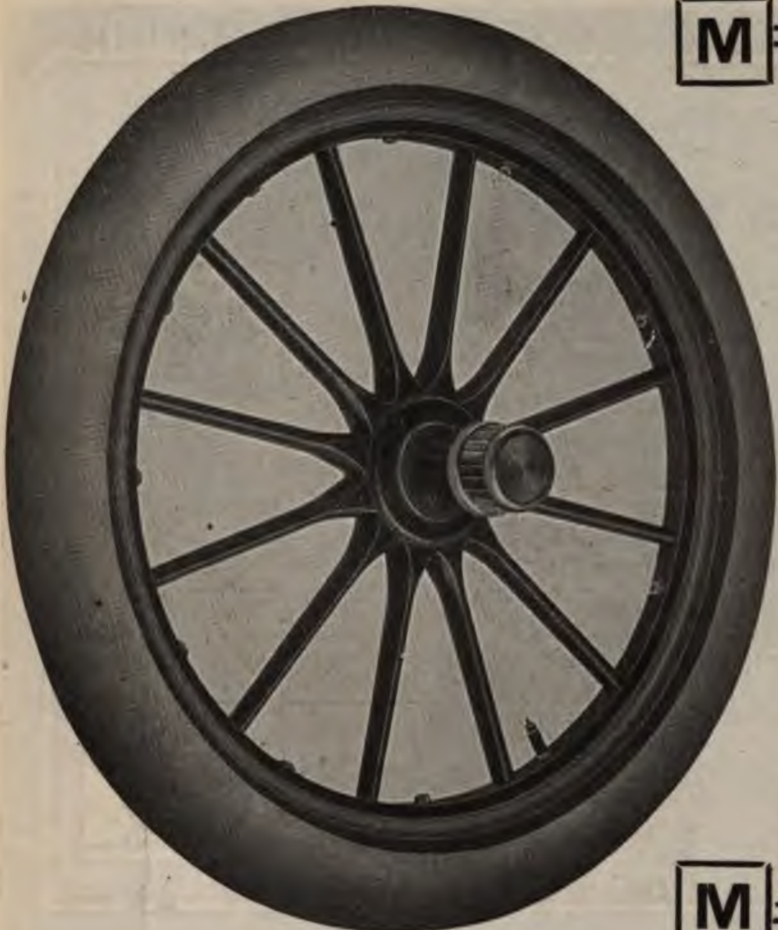

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Want, For Sale and similar advertisements only inserted under this heading at the rate of 20 cents a line of about seven words. Copy for this department should be in our hands not later than the Monday morning preceding the issue for which it is intended. Nothing less than two lines accepted. Answers addressed to HORSELESS AGE will be forwarded if postage is enclosed.

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FOR SALE—Steam Surrey with canopy top good as new, run 800 miles. Price $500. Will send photo if desired. George E. Sawyer, Portland, Me.

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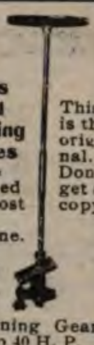

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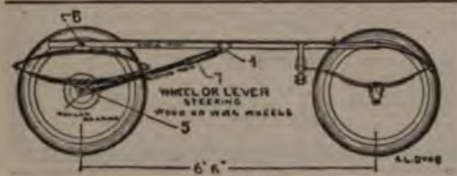

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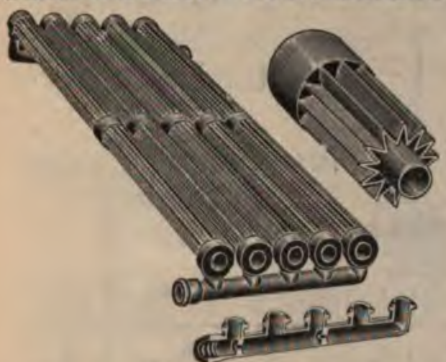

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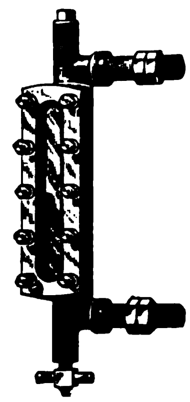

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